

MeteorNews

Vol. 3 / October 2016



On 23 September 2016 at 22:34:15 UT
United Kingdom saw another fireball.

- **Enhanced Perseid activity 11–12 August**
- Fireball events
- **Visual observing reports**

- CAMS 2016 activity: from heaven to hell and back to heaven
- **Activity of the September Perseids**
- Observations by RAMBo

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Front cover picture: Fireball over United Kingdom on 23 September 2016.

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Perseid observing expedition at Revest du Bion, Provence, Southern France

Koen Miskotte

Dutch Meteor Society

k.miskotte@upcmail.nl

Overall this was a very successful expedition. Also photographically it was a great success; both cameras captured roughly 350 meteors among which several very nice photographs.

1 Introduction

This report describes the observing sessions I had together with Michel Vandeputte at a small village, Revest du Bion in Southern France. The weather is in general very good in the Provence but this year we enjoyed exceptional good conditions. Thanks to the extreme clear sky with frequently a lot of Mistral wind this expedition was most successful. The Mistral wind is a very dry wind from the North which creates very clear skies and perfect observing conditions. In numbers, with 3050 observed meteors, this was the best Perseid observing expedition ever since 1986. The total number of hours I could observe, 54.52 hours, was the highest amount of observing time since 1985.

This year I travelled with the High Speed train TGV from Brussels to Marseille. Although I travelled with this kind of trains before, it is still a great experience. You travel at about 300 km per hour to the sunny region of Southern France. From Marseille I took a local train to Manosque where the family Vandeputte picked me up.



We were able to observe each night. Only 4–5 August remained to a large extent cloudy but towards the morning still 50 minutes of observing were possible after the passage of a cold front. Also 9–10 August looked like it would remain cloudy, but unexpectedly two periods of clear sky allowed another 1.5 hours of data sampling. All other nights were clear. An overview of the observations is presented. The numbers of meteors are based on my own data, Michel observed about the same numbers.

2 The observations

1/2 August

Michel could observe a few hours while I was still in the Netherlands.

2/3 August 2016

84 meteors with little or no peculiarities in 3.75 hours effective observing time and a limiting magnitude of +6.7. Maximum number of Perseids per hour: 7.

3/4 August 2016

A nice observing night with 188 meteors seen in T_{eff} 5.05 hours with a limiting magnitude of +6.7. Mainly faint meteors but that was compensated by the appearance of a –8 sporadic fireball. This fireball has also been captured by the all-sky camera (Canon 6D with a Canon Ef 8-15 mm F 4.0 zoom fish eye lens). Highest count of the Perseids: 20.



4/5 August 2016

Passage of a cold front and clear sky before twilight with 0.83 hour of effective observing time. 32 meteors were seen among which 12 mainly faint Perseids.



Figure 3 – Bright sporadic fireball of magnitude -12 . Camera: Canon 6D. Lens: Canon EF 8-15 mm F 4.0 zoom fish eye lens. Exposure time: 29 seconds. ISO: 2000. F: 4.5. Crop of the original image.



Figure 4 – Perseid fireball magnitude -6 on August 10, 2016 at $01^{\text{h}}41^{\text{m}}$ UT. Camera: Canon 6D. Lens: Canon EF 8-15 mm F 4.0 zoom fish eye lens. Exposure time: 29 seconds. ISO: 2000. F: 4.5. Crop of the original image.

5/6 August 2016

Superb clear sky caused by a strong Mistral wind allowed 5.5 hours effective observing with a limiting magnitude of +6.8. 212 meteors were seen including many faint Perseids. Highest hourly count of the Perseids: 21.

6/7 August 2016

Although the Mistral wind weakened the sky was still crystal clear with 234 meteors seen in 5.58 hours effective observing with a limiting magnitude of +6.8. The number of Perseids increased compared to previous nights and a –3 Perseid appeared. Highlight of the night was an at first glance estimated –10 sporadic fireball at 22h08m UT. It was one of the most impressive fireballs that I ever observed. The distinct greenish colored fireball left an unforgettable impression. I think that the initial estimate as magnitude –10 was too conservative and magnitude –12 is a better value. Comparing the exposure with the fireball with the next exposure it is obvious that the entire field of view was slightly lightened.

Highest hourly count of the Perseids was 26.

7/8 August 2016

Slightly less perfect conditions, but what to complain about with a limiting magnitude +6.7 instead of +6.8. 221 meteors in an effective observing time of 5.52. The brightest meteor I observed was a –3 Perseid. Highest hourly count of the Perseids: 29.

8/9 August 2016

Again slightly less good circumstances due to haze and later on cirrus clouds moving in ahead of an arriving front. 206 meteors in 4.7 hours effective observing time with a limiting magnitude of +6.7, later decreasing during the night. Highest hourly count of the Perseids: 31. No bright meteors were seen.

9/10 August 2016

This night was expected to be cloudy but it turned out not to be that bad. Lots of cirrus clouds with two periods of clear sky that allowed observing. 81 meteors were counted in 1.63 hours effective observing, including a –6 Perseid (outside the observing period). Highest count of the Perseids: 27 ($T_{\text{eff}} 0,60 \text{ hr}$).

10/11 August 2016

This night was supposed to be crystal clear but when we got outside we had a nasty surprise. The sky was filled up with orographic clouds (clouds in the shape of flying saucers or long cigars). Luckily these resolved after a while and the limiting magnitude got +6.7. The Perseids performed quite strong, probably no enhanced activity yet but a maximal hourly count of 57. I saw 344 meteors in 5.73 effective observing hours, including two Perseids of –3 and one of –4.

11/12 August 2016: wow what a show!

The night with expected enhanced Perseid activity. As soon as 19h50m UT Koen started observing at dusk, not yet officially counting, but to witness any possible early

outburst or some nice Earth grazers. Just a minute after start a nice –2 KCG was seen, the activity remained modest. Some cirrus had been forecasted and therefore we felt a bit worried. Indeed there was some thin cirrus layer but that did not pose any problem. When the effective visual observing session could start at 20h30m UT the Milky Way was visible in spite of the presence of the Moon at First Quarter and the limiting magnitude was near +6.0. The first hour was rather calm with some dozens of meteors. After a short period all the cirrus had disappeared except at the western horizon and some orographic clouds could be seen low at the southern and western horizon. During the night most of the orographic clouds would disappear.



Figure 5 – Ready for action!

The activity increased in the second hour including a –5 Perseid. About 21h30m UT it became obvious that something was going on. More and more bright Perseids occurred but also a lot of faint stuff. The activity culminated in a peak between 23h15m. A first calculation of the ZHR based on Koen's observations indicates that the ZHR was close to 300! During the time of the peak you could see Perseids popping up all over the sky and each minute there were 1 or 2 Perseids of magnitude +1 to –3. Some minutes we counted 4 to 5 Perseids per minute. This was very nice to watch. Suddenly the activity level collapsed after 23h23m UT. Within a few minutes the hourly rate dropped by half. Also the Japanese radio observations show this. We had never before seen such a steep decline in activity. It was a spectacular outburst! In the period immediately after this outburst we were treated with some nice fireballs of –4 till –8.

After 2h30m the activity decreased, but probably the twilight and upcoming cirrus clouds also reduced the



Figure 6 – Perseid fireball of magnitude -8 , captured during the second peak of the Perseid outburst of August 12, 2016 at 02^h15^m UT. Camera; Canon 5D. Lens: Canon EF 35 mm F 1.4 lens. Exposure time: 29 s. ISO: 1600. F 2.0. The persistent train was visually 30 seconds visible, but photographically it was visible for 13 minutes.





Figure 8 – Persistent train of the Perseid fireball of August 12, 2016 at 02^h:15^m UT.

The observations quit about 3^h25^m UT when the twilight was already quite bright. We gave each other a pat; what a splendid meteor show we had witnessed. It was the most impressive event since the Leonids 2001 which we observed both from China.

12/13 August 2016

Again a top night although with a lot of moonlight during the first hours. After moonset the limiting magnitude reached again +6.8 with a beautiful starry sky with a deep dark background. Nice numbers of Perseids but rather few real fireballs. A Perseid of –3 and one of –6 were seen. 6.22 hour of effective observing resulted in 471 meteors. Highest hourly count of the Perseids: 101.



Figure 9 – Celebrating the highly successful Perseid campaign 2016 with wine and Provençal goat cheese. Left: Koen, right Michel.

13/14 August 2016

My final observing session at Revest du Bion yielded another 193 meteors observed in 3.2 hours of effective

observing time, including a –3 KCG, a –3 and a –4 Perseid. Although the Mistral wind remained absent, just like during 12–13 August, we got again a deep dark sky background (limiting magnitude +6.8), with as highest hourly counts of the Perseids: 51.



Figure 10 – Last night at Revest du Bion!

14/15 August 2016

Michel could still observe a couple of hours on his own. I had meanwhile returned to the Netherlands.

Visual observing reports

Paul Jones and Robert Lunsford

After a long period of exceptional poor weather, August and September offered plenty of clear nights at many observing sites worldwide. Enhanced Perseid activity had been predicted due to some dust trails that could encounter Earth 11–12 August, almost a day ahead of the traditional Perseid maximum. These predictions proved valid and were confirmed by many observers and different observing techniques. September is characterized by a rich meteor activity level and a slightly enhanced activity of the Epsilon Perseids has been reported.

1 Perseid reports by Paul Jones

2016 August 2–3, cirrus clouds and PERs

After two pretty much overcast nights, it was somewhat better this morning, so I ventured down to Matanzas Inlet to see what would happen. When I got there, the sky was full of long, thin wisps of cirrus clouds looking just like spokes of a giant wheel, moving slowly across the sky.

I figured I could see some meteors right through it, so I hung around and sure enough, after just a couple of minutes, a lovely long, bright and swift eta Eridanid candidate flashed through the wispy bands. From there on, the meteors did real well going through, in, out and around the bands of cirrus haze.

Here are my results:

- CAP – alpha Capricornids
- ERI – eta Eridanids
- ANT – Antheions
- PER – Perseids
- SDA – South delta Aquariids
- PAU – Piscids Austrinids
- GDR – July gamma Draconids
- BPE – beta Perseids

Session One:

August 2/3 2016, observer: Paul Jones, Location: North Bank of Matanzas Inlet, Florida, Lat: 29.75N, Long: 81.24W (approximately 18 miles south of St. Augustine, Florida). 25% cirrus cloud interference, Facing: west

0325 – 0425 EDT (0725 – 0825 UT), T_{eff} : 1.0 hour, No breaks

- 13 PER: -1, +1(3), +2(2), +3(5), +4(2)
- 4 SDA: +1, +2(2), +3
- 1 CAP: 0
- 1 ERI: +1
- 10 SPO: +3(3), +4(4), +5(3)
- 29 total meteors

9 of the 29 meteors (5 PERs, 2 SDAs, the CAP and the ERI) left trains. Yellow and blue tints were seen in the brighter PERs and the SDAs.

Session Two:

August 2/3, 2016 Observer: Paul Jones, Location: North Bank of Matanzas Inlet, Florida, Lat: 29.75N, Long:

81.24W (approximately 18 miles south of St. Augustine, Florida).

0425 – 0525 EDT (0825 – 0925 UT) T_{eff} : 1.0 hour, No breaks, LM: 6.9, Clear, except for some very slight haze near the horizons, facing: west

- 17 PER: -2(2), -1, +2(4), +3(5), +4(4), +5
- 5 SDA: +1(3), +2, +3
- 1 CAP: -1
- 8 SPO: +1, +2, +3(4), +4, +5
- 31 total meteors

12 of the 31 meteors left trains (6 PERs, 4 SDA, the CAP and one SPO), a couple of the PERs were bluish and a couple were yellowish, as was the bright CAP.

It was a surprisingly successful watch, considering at times almost 70% of the sky was awash with cirrus bands. However, the combination of bright ones shining right through the thin haze and faint ones hitting in between them, I did pretty good. Of course, the spectacular dark skies of Matanzas Inlet helped, too. The bright PERs were so fast that the flashes of the -2s were almost after thoughts! That is, before you realize you saw them, they were already gone...;o).

Just before twilight became obvious, I was treated to an amazing display of zodiacal light in the east. It appeared as bright as or brighter than I ever recall seeing it before. I could readily see how it earned its other popular name: “the false dawn”. That is exactly what it looked like, creeping up the legs of Gemini and stretching into the Hyades and Pleiades. It was a stunning view!

2016 August 3–4, two mirror image hours!

I ventured down once again to Matanzas Inlet for two more hours of pre-max Perseid observations. This time, the cirrus clouds were gone and the sky was blissfully clear. My results for each of the two hours was almost identical!

Here’s the data:

Observed for radiants:

- CAP – alpha Capricornids
- ERI – eta Eridanids
- ANT – Antheions
- PER – Perseids

- SDA – South delta Aquariids
- PAU – Piscids Austrinids
- NDA – North delta Aquariids
- KCG – kappa Cygnids
- BPE – beta Perseids

Session One:

August 3/4 2016, observer: Paul Jones, Location: North Bank of Matanzas Inlet, Florida, Lat: 29.75N, Long: 81.24W (approximately 18 miles south of St. Augustine, Florida). 25% cirrus cloud interference, Facing: west

0325 – 0425 EDT (0725 – 0825 UT), T_{eff} : 1.0 hour, No breaks

- 14 PER: +1(2), +2(5), +3(3), +4(2), +5(2)
- 6 SDA: +1, +2, +3(3), +5
- 1 NDA: +3
- 1 CAP: +3
- 1 ERI: +3
- 8 SPO: +2, +3, +4(4), +5(2)
- 31 total meteors

7 of the 31 meteors (6 PERs and 1 SDA) left trains. Yellow and blue tints were seen in the brighter PERs and the SDAs.

Session Two:

August 3/4, 2016 Observer: Paul Jones, Location: North Bank of Matanzas Inlet, Florida, Lat: 29.75N, Long: 81.24W (approximately 18 miles south of St. Augustine, Florida).

0425 – 0525 EDT (0825 – 0925 UT) T_{eff} : 1.0 hour, No breaks, LM: 6.9, Clear, except for some very slight haze near the horizons, facing: west

- 14 PER: +2(4), +3(8), +5(2)
- 5 SDA: +2, +3(2), +4, +5
- 1 NDA: +4
- 2 ERI: +3, +4
- 9 SPO: +1, +2, +3(3), +4(4)
- 31 total meteors

9 of the 31 meteors left trains (7 PERs, 1 SDA and 1 SPO), a couple of the PERs were bluish and a couple were yellowish.

I was struck by how almost identical the two hours turned out in terms of the numbers. They were almost mirror images of one another! The biggest difference in the meteors of all types this morning was that they were so much fainter than the previous morning – across the board.

I was lucky the skies were so good or I would not have seen many of them through yesterday's cirrus cloud invasion...;o).

2016 August 4–5, one very busy hour!!!

The lost sleep must be catching up to me! I slept right through my normal wake up time of 2:00 a.m. this

morning – “sleeping in” all the way until 4:00 a.m.! I think I threw on some clothes and high tailed it down to Matanzas Inlet, as once again skies were gorgeous!

I set up shop at 04:25 local time and it was apparent right away that the PERs had picked up a whole bunch from the previous morning!

Here's my results:

Observed for radiant:

- CAP – alpha Capricornids
- ERI – eta Eridanids
- ANT – Anthelions
- PER – Perseids
- SDA – South delta Aquariids
- PAU – Piscids Austrinids
- NDA – North delta Aquariids
- KCG – kappa Cygnids
- BPE – beta Perseids

August 4/5 2016, observer: Paul Jones, Location: North Bank of Matanzas Inlet, Florida, Lat: 29.75N, Long: 81.24W (approximately 18 miles south of St. Augustine, Florida). LM: 6.8, Facing: west

0425 – 0525 EDT (0825 – 0925 UT), T_{eff} : 1.0 hour, No breaks,

- 33 PER: 0, +1(3), +2(7), +3(11), +4(8), +5(3)
- 3 SDA: +3(3)
- 1 NDA: +2
- 1 CAP: +3
- 2 ERI: +2, +3
- 10 SPO: +2, +3, +4(4), +5(2)
- 50 total meteors

13 of the 50 meteors (11 PERs, 1 ERI and 1 SPO) left trains. Yellow and blue tints were seen in the brighter PERs and the SDAs.

I must have started right in the middle of a nice PER burst, because I had five of them within the first three minutes – including a pair of perfectly simultaneous +3 PERs about 5 degrees apart! From there, the activity continued at a fast, even pace for the whole hour.

My fellow ACACer Brenda Branchett was also out down in Deltona, Florida and confirmed my impressions of the high PER activity, her report will follow separately. She even had a –4 PER fireball just a bit before I got out. That's what I get for over-sleeping...;o).

Looking forward, our observing chances have been threatened considerably by a low pressure system forming in the Gulf of Mexico. It will be touch and go in the weather department here in North Florida for at least the next few days. All fingers and toes will be crossed for some clear skies!

2016 August 5-6

Conditions were very challenging this morning as cirrus clouds and haze from the disturbance forming in the Gulf of Mexico pretty much dominated large chunks of the sky.

It was worse for me at Matanzas Inlet than it was for my fellow ACACer Brenda Branchett in Deltona, Florida. I struggled mightily with my one observable hour, but she got in a real good one from down there (about 75 miles south of me at Matanzas Inlet).

Here's what we saw:

Observed for radiants:

- CAP – alpha Capricornids
- ERI – eta Eridanids
- ANT – Anthelions
- PER – Perseids
- SDA – South delta Aquariids
- PAU – Piscids Austrinids
- NDA – North delta Aquariids
- KCG – kappa Cygnids
- BPE – beta Perseids

August 5/6 2016, observer: Paul Jones, Location: North Bank of Matanzas Inlet, Florida, Lat: 29.75N, Long: 81.24W (approximately 18 miles south of St. Augustine, Florida). LM: Var., 35% cirrus cloud cover, Facing: west

0315 – 0415 EDT (0715 – 0815 UT), T_{eff} : 1.0 hour, No breaks,

- 16 PER: 0, +1, +2(5), +3(5), +4(3), +5
- 1 SDA: +2
- 1 NDA: 0
- 1 KCG: +1
- 1 BPE: +1
- 5 SPO: +2, +3, +4(2), +5
- 25 total meteors

6 of the 25 meteors (3 PERs, 1 BPE, 1 KCG and 1 NDA) left trains. Yellow and blue tints were seen in the brighter PERs and the SDAs.

I tried to get in a second hour, but conditions worsened even more and data just wasn't possible to get after 4:30 a.m. My colleague Brenda Branchett though had much better fortune in Deltona and she managed two good, productive hours from down there. Here's her results:

August 5/6, 2016

Time : 4:15 – 5:15 a.m. (0815 0915 UT)

Observer: Brenda Branchett, Location: Deltona, Florida.

Sky visible: 60 percent

Magnitude: +4.5-5.0 (Had thin cirrus clouds swirling around horizons.)

Perseids: 32 (I noticed a higher percentage of brighter Perseids this morning which helped with sky conditions. A few minus 2, one minus 3, a minus 1 and zero magnitude. A few second and third were visible as well. overall, a nice display, with trains averaging 15-20 degrees.) Colors range yellow-orange and blue-white.

- Sporadics: 7
- SDA: 1
- ERI: 3
- KCG: 1
- Total: 44
- Satellites: 2

2016 August 6-7, a real WOW PER fireball!

The disturbance in the Gulf of Mexico was supposed to wipe us out last night, but instead the skies cleared beautifully in the afternoon and it was almost perfect for a memorable two hour pre-dawn watch this morning. Fellow ACACer Lynne Pouliot joined me at Matanzas Inlet and Brenda Branchett was out once again down in Deltona, Florida to our south.

I think all the hours of lost sleep are catching up with me as my results were somewhat off this morning and Brenda topped me quite a bit on her observed PER rates. It was great to have Lynne's company though and we did see a lot of nice PERs and others in addition to the awesome –4 PER fireball at the end.

Here's my results:

- CAP – alpha Capricornids
- ERI – eta Eridanids
- ANT – Anthelions
- PER – Perseids
- SDA – South delta Aquariids
- PAU – Piscids Austrinids
- NDA – North delta Aquariids
- KCG – kappa Cygnids
- BPE – beta Perseids

Session One:

August 6/7 2016, observer: Paul Jones, Location: North Bank of Matanzas Inlet, Florida, Lat: 29.75N, Long: 81.24W (approximately 18 miles south of St. Augustine, Florida). LM: 6.7, Clear, Facing: west

0325 – 0425 EDT (0725 – 0825 UT), T_{eff} : 1.0 hour, No breaks

- 28 PER: 0, +1(4), +2(7), +3(10), +4(4), +5(2)
- 4 SDA: 0, +3, +4(2)
- 1 NDA: +3
- 2 CAP: -1, +2
- 1 ERI: +2
- 1 BPE: +1
- 9 SPO: +2(2), +3, +4(3), +5(3)
- 46 total meteors

12 of the 46 meteors (8 PERs, 1 SDA, 1 NDA, 1 BPE and 1 SPO) left trains. Yellow and blue tints were seen in the brighter PERs and the SDAs.

Session Two:

August 6/7, 2016 Observer: Paul Jones, Location: North Bank of Matanzas Inlet, Florida, Lat: 29.75N, Long: 81.24W (approximately 18 miles south of St. Augustine, Florida).

0425 – 0525 EDT (0825 – 0925 UT) T_{eff} : 1.0 hour, No breaks, LM: 6.9, Clear, except for some very slight haze near the horizons, facing: west

- 27 PER: -4, +1(3), +2(7), +3(8), +4(6), +5(2)
- 1 SDA: +2
- 1 NDA: +4
- 1 ERI: +3
- 1 BPE: +2
- 8 SPO: +1, +2, +3(2), +4(3), +5
- 39 total meteors

14 of the 39 meteors left trains (11 PERs, 1 SDA and 2 SPO), a couple of the PERs were bluish and a couple were yellowish, but the -4 PER fireball was both blue and yellow with tints of orange as well with a seven second train left behind it – a rainbow meteor!

Lynne and I had a great time discussing the meteors we saw and comparing impressions on magnitudes. We were pretty close on most of them. The PER fireball perfectly placed at the end of the session was an amazing treasure for the watch. It made it all worthwhile!

Here's Brenda's data and impressions also from Deltona, Florida:

Date: August 6/7, 2016

Location: Deltona, Fl.

Sky visible: 70 percent

Sky conditions first hour: Started out a bit hazy with +4.5 mag visible. Clearing as the hour progressed, improving to +5.0 – +5.5 mag visible

Time: 3:30-4:30 EDT (0730 – 0830 UT)

PER – 42 (mostly observed 2nd and 3rd mag. Nothing brighter than 0 mag.)

- SPO:5
- KCG: 3
- ERI: 2
- SDA: 1
- Total: 53

Time: 4:30-5:30 EDT (0830 – 0930 UT)

PER: 32 (this hour the sky conditions were a bit more hazy with +4.5 mag visible, it did clear back to +5.0 mag visible during the hour.)

Once again, mostly 2nd and 3rd mag visible, right at 5:30, minus 4 Per)

- SPO: 5
- KCG: 1
- SDA: 2
- ERI: 2
- Satellites: 3, which includes the Hubble
- Total: 42

All in all, it was an eventful morning all around and one we were not supposed to have gotten in. So far, the system in the Gulf has produced little rain to speak of and nights are mostly clear! May the Force continue to be with us in the nights ahead! We want to see many more PER fireballs like the one we had this morning!!

2016 August 7–8, Perseids cruising right along

It seems like I have been writing about the Perseids for months now and they haven't even reached their maximum yet! Both Brenda Branchett and I were out again, me at Matanzas Inlet and she in Deltona to monitor the build up of the 2016 Perseids.

Once again Mother Nature cooperated with us beautifully with gorgeous pre-dawn skies and PER rates were around 30 an hour with a few nice bright ones included. All the other active sources continue to produce some nice meteors also, making for a really enjoyable experience out there.

Here's my results:

- CAP – alpha Capricornids
- ERI – eta Eridanids
- ANT – Antheions
- PER – Perseids
- SDA: South delta Aquariids
- PAU – Piscids Austrinids
- NDA – North delta Aquariids
- KCG – kappa Cygnids
- BPE – beta Perseids

Session One:

August 7/8 2016, observer: Paul Jones, Location: North Bank of Matanzas Inlet, Florida, Lat: 29.75N, Long: 81.24W (approximately 18 miles south of St. Augustine, Florida). LM: 6.7, Clear, Facing: west

0325 – 0425 EDT (0725 – 0825 UT), T_{eff} : 1.0 hour, No breaks

- 25 PER: -1(2) +1(2), +2(5), +3(8), +4(4), +5(4)
- 2 SDA: +2, +4
- 1 NDA: +3
- 1 CAP: +4
- 1 PAU: 0
- 2 ERI: +2, +3
- 9 SPO: +2(2), +3, +4(3), +5(3)
- 41 total meteors

11 of the 41 meteors (7 PERs, 1 SDA, 1 PAU, 1 ERI and 1 SPO) left trains. Yellow and blue tints were seen in the brighter PERs and the SDAs.

Session Two:

August 7/8, 2016 Observer: Paul Jones, Location: North Bank of Matanzas Inlet, Florida, Lat: 29.75N, Long: 81.24W (approximately 18 miles south of St. Augustine, Florida).

0425 – 0525 EDT (0825 – 0925 UT) T_{eff} : 1.0 hour, No breaks, LM: 6.9, Clear, except for some very slight haze near the horizons, facing: west

- 28 PER: -1, 0, +1(3), +2(5), +3(9), +4(7), +5(2)
- 1 SDA: +2
- 2 NDA: +2, +4
- 1 ERI: +3
- 10 SPO: +1(2), +2(2), +3(2), +4(3), +5
- 42 total meteors

13 of the 42 meteors left trains (10 PERs, 1 SDA and 2 SPO), a couple of the PERs were bluish and a couple were yellowish as usual.;o).

Brenda battled cloud problems but did manage one hour out down in Deltona and as usual, saw a few more PERs during that hour than I did...;o).

Here's her data:

Location: Deltona, Fl.

Time: 4:15-5:15 a.m. EDT (0815 – 0915 UT)

Sky visible: 60-70 percent

Sky Conditions: 4.5-5.0 Mag visible

- Perseids: 31
- Sporadics: 4
- SDA: 2
- CAP: 1
- ERI: 1
- KCG: 2
- Total: 41
- Satellites: 5

Had a minus 3 SDA and a minus 1 Perseid. Otherwise, mostly 2nd and 3rd mag visible. Overall, nothing very impressive except for that minus 3 of course! Very few trains, averaging 10 degrees.

Its amazing how consistent in activity level the PERs have been the last few mornings. It's almost as if they are in Cruise Control or something...;o).

2016 August 8-9, PERs nudge 40 an hour!

Despite that pesky low pressure system hovering around in the northern Gulf of Mexico like a big wet helicopter, we continue to defy the odds by having some beautiful clear

mornings to check out the PERs! Bot Brenda Branchett and I managed another great hour under the stars.

This morning it did get a bit more dicey for us however, as I was only able to get in one good hour due to lingering clouds. I got down to Matanzas Inlet at about 0330 EDT and the sky was mostly clear. I settled in and before long, I had bagged a -1 PER and then a 0 magnitude PER right behind it! I was stoked for a great watch... but then...the clouds multiplied out of nowhere and the meteors promptly stopped.

It took almost a full hour for the clouds to drain away, but they finally did and the PERs kicked right back in where they had left off! I finished the second hour with 38 PERs plus 21 others for a total of 59 meteors – almost one a minute! Brenda had a great hour too.

Here's my results:

- CAP – alpha Capricornids
- ERI – eta Eridanids
- ANT – Antheions
- PER – Perseids
- SDA – South delta Aquariids
- PAU – Piscids Austrinids
- NDA – North delta Aquariids
- KCG – kappa Cygnids
- BPE – beta Perseids

August 8/9, 2016 Observer: Paul Jones, Location: North Bank of Matanzas Inlet, Florida, Lat: 29.75N, Long: 81.24W (approximately 18 miles south of St. Augustine, Florida).

0425 – 0525 EDT (0825 – 0925 UT) T_{eff} : 1.0 hour, No breaks, LM: 6.9, Clear, but some residual high clouds around about 10% of the sky, Facing west

- 38 PER: -2 (2) -1(2), 0(2), +1(3), +2(7), +3(11), +4(8), +5(3)
- 2 SDA: +2
- 2 NDA: +2, +4
- 4 ERI: +3
- 13 SPO: +1(2), +2(2), +3(2), +4(3), +5
- 59 total meteors

24 of the 59 meteors left trains (16 PERs, 1 SDA, 1 NDA, 2 ERI and 4 SPO), a couple of the PERs were bluish and a couple were yellowish as usual.;o).

Here's Brenda's impressions of that last hour:

Time: 4:15-5:15 a.m.

Sky Conditions: 4.5 mag visible. Had cloud passing overhead for about 15 minutes.

Visible Sky: 50-70 percent

- Perseids: 33
- Sporadic: 5

- KCG: 1
- SDA: 1
- ERI: 1
- Total: 41
- Satellites: 7 with Hubble

I had a minus 1, minus 2 and minus 3 Perseid leaving at least 20 degree trains. A few first magnitude, 2nd and 3rd visible when sky was clear.

I also had a total of four meteors that looked identical to each other streak north out of central Cetus, the Whale during the hour. They were obviously not ERIs, but seemed to come from a common radiant. I logged them as sporadics, it will be interesting to see what the CAMS folks from around the world picked up on their cameras this morning!

As I type this report it is raining and has been for quite awhile. Here's hoping it will magically clear off after midnight once again, the "gittin" is gittin really good up there!

2016 August 9–10, Perseids in high gear!

Once again it was gorgeously clear here this morning so I did two more memorable hours down at Matanzas Inlet and saw PER rates rise to about one per minute! For once, clouds were no issue at all for the entire two hour period and it sure did make a difference in the observed rates!

It's obvious that the PER stream is getting thicker as well though. The first hour was fairly normal, but then the rates hit the roof as the radiant neared the meridian. The delta Aquariids also put on a fine show and I saw a couple more meteors emanate from the central Cetus areas as well.

Here's my results:

- CAP – alpha Capricornids
- ERI – eta Eridanids
- ANT – Anhelions
- PER – Perseids
- SDA – South delta Aquariids
- PAU – Piscids Austrinids
- NDA – North delta Aquariids
- KCG – kappa Cygnids
- BPE – beta Perseids

Session One:

August 9/10 2016, observer: Paul Jones, Location: North Bank of Matanzas Inlet, Florida, Lat: 29.75N, Long: 81.24W (approximately 18 miles south of St. Augustine, Florida). LM: 6.9, Clear, Facing: west

0325 – 0425 EDT (0725 – 0825 UT), T_{eff}: 1.0 hour, No breaks

- 32 PER: -1(2)+1(4), +2(8), +3(8), +4(6), +5(4)
- 6 SDA: 0, +1,+2, +3(2), +4(2)
- 4 NDA: +1, +2(2), +3

- 1 KCG: +3
- 1 ERI: +2
- 11 SPO: +2(2), +3, +4(3), +5(3)
- 55 total meteors

19 of the 55 meteors (12 PERs, 2 SDA, 1 NDA, 1 ERI and 3 SPO) left trains. Yellow and blue tints were seen in the brighter PERs.

Session Two:

August 9/10, 2016 Observer: Paul Jones, Location: North Bank of Matanzas Inlet, Florida, Lat: 29.75N, Long: 81.24W (approximately 18 miles south of St. Augustine, Florida).

0425 – 0525 EDT (0825 – 0925 UT) T_{eff}: 1.0 hour, No breaks, LM: 6.9, Clear, facing: west

- 57 PER: -4, -3(2), -2(2), -1(2), 0(3), +1(6), +2(11), +3(17), +4(9), +5(4)
- 5 SDA: +1, +2(2), +3(2)
- 3 NDA: +2(2), +4
- 12 SPO: +1(2), +2(2), +3(3), +4(4), +5
- 77 total meteors

32 of the 77 meteors left trains (27 PERs, 1 SDA and 4 SPO), a couple of the PERs were bluish and a couple were yellowish as usual...;o). The -4 PER left a train that lasted several seconds.

An amazing session indeed – 132 meteors in 120 minutes! The PERs began to really exhibit their clumping effect this morning, with three or four seen in quick succession a number of times in the second hour. Both the -3s appeared in almost exactly the same place in the northern sky near Polaris about fifteen minutes apart. The -4 crossed the zenith.

It was hard to keep up with everything this morning especially in that wild and crazy second hour! And we still have awhile to go until the maximum. It should really be something at the rate they are ramping up now! May The Force be with all of us!

2016 August 10–11, foggy Perseids...;o!

Well, once again Mother Nature smiled broadly on me this morning from Matanzas Inlet! There were mountains of thick fog almost everywhere else except over me at the Inlet! I managed to stay totally clear until almost sunrise and had two more glittering hours of pre-max, Perseid observing.

I ended up with the grand total of 150 meteors between 0325 and 0525 EDT with 114 of them being Perseids! Needless to say, it was a busy session indeed. I tried out my new toy on this watch – a digital voice recorder to keep track of my data and it worked like a charm! I don't know why I didn't think of this sooner...;o). I was able to voice record my impressions on each meteor without having to take my eyes away from the sky at all. With the PERs doing their usual clumping and spurting, I was able to see many additional follow-on PERs this way!

Here's what I ended up with:

- CAP – alpha Capricornids
- ERI – eta Eridanids
- ANT – Antheions
- PER – Perseids
- SDA – South delta Aquariids
- PAU – Piscids Austrinids
- NDA – North delta Aquariids
- KCG – kappa Cygnids
- BPE – beta Perseids

Session One:

August 10/11 2016, observer: Paul Jones, Location: North Bank of Matanzas Inlet, Florida, Lat: 29.75N, Long: 81.24W (approximately 18 miles south of St. Augustine, Florida). LM: 6.9, Clear, Facing: west

0325 – 0425 EDT (0725 – 0825 UT), T_{eff} : 1.0 hour, No breaks

- 49 PER: -3, -2, -1(2), 0(4), +1(3), +2(11), +3(14), +4(10), +5(3)
- 5 SDA: +3(3), +4(2)
- 4 NDA: +3, +5(3)
- 1 KCG: +2
- 1 ERI: +3
- 1 ANT: +2
- 10 SPO: 0, +1, +2, +4(6), +5
- 71 total meteors

16 of the 71 meteors (13 PERs, 1 KCG, 1 ERI and 1 SPO) left trains. Yellow and blue tints were seen in the brighter PERs.

Session Two:

August 10/11, 2016 Observer: Paul Jones, Location: North Bank of Matanzas Inlet, Florida, Lat: 29.75N, Long: 81.24W (approximately 18 miles south of St. Augustine, Florida).

0425 – 0525 EDT (0825 – 0925 UT) T_{eff} : 1.0 hour, No breaks, LM: 6.9, Clear, facing: west

- 65 PER: -4, -2, 0(4), +1(6), +2(17), +3(17), +4(12), +5(7)
- 1 SDA: +2
- 3 ERI: 0, +2, +3
- 9 SPO: -1, +1, +2, +3(4), +4(2)
- 79 total meteors

27 of the 79 meteors left trains (22 PERs, 2 ERI and 3 SPO), a couple of the PERs were bluish and a couple were yellowish as usual...o). The -4 PER left a train that lasted several seconds, as did the -2 PER and a couple of the zeroes.

There several just spectacular bright PERs shooting out in all directions and many of them were long-pathed and colorful! The well known PER clumping effect was noted big time this morning also as several minute lulls in

activity were followed by furious spurts of 4 or 5 PERs in quick succession. A couple of really nice ERIs graced the second hour as well!

At the end of the second hour, I kept on observing, digging deeply into astronomical twilight on what we used to call “bolide patrol”; that is, searching the gathering twilight for Perseid fireballs that seem to have a habit of popping into the twilight skies. I didn't catch any this morning, but I did catch an additional 20 PERs this way with a lovely -1 in 30 minutes from 0525 – 0555 EDT. It was mostly casual observing, but fun to see if I could “catch a big one”...;o). Maybe in the morning...

Looks good here for the max... all fingers are crossed!

2016 August 11–12, A session for the Ages!

Meteor watches can turn out to be very memorable affairs sometimes. Anytime you get a bunch of great folks together with a major shower maximum under a glittering sky full of meteors – magic is made. Such was the case for those of us at Matanzas Inlet (MI) on this amazing morning!

We arrived in the trusty MI parking lot at 11:30 p.m. to moonlit skies laced with patches of cirrus haze in all directions. Our contingent was about 16 folks strong – a half and half mixture of ACAC members and newly met guests, recruited from our outreach efforts for the sharing of the Perseid Meteor Shower with the public. In fact, we far outnumbered the MI flounder fishermen this day and even ended up recruiting one of them to stay with us until dawn broke!

The first couple of hours were somewhat slow as the moon sank and the cirrus dissipated. Still, we were able to catch several long-pathed early Perseids streaking up from the radiant which was grazing the northeast horizon at that time. We saw them all over the sky, even in the west and SW – many bright and colorful, leaving spreading trains behind them

The 62.8% sunlit moon set at 1:43 a.m. and the action kicked in in triplicate soon after. In short time, we were catching negative magnitude Perseid meteors popping all over the sky! The shouted “oohs and ahhs” of the group after each awesome Perseid meteor could be heard all over the inlet, we found out later...;o). And it only got better!

When the PER radiant “rounded the turn” and started up the eastern sky the action got hot and heavy real quick! We were catching bursts and spurts of Perseids numbering 3,4 or even 5 or more meteors popping in quick succession in every direction! The 2 – 3 a. m. hour was a very good one with lots of bright, colorful Perseids. I counted 63 of them in this hour – one per minute average.

We hadn't seen anything yet, however! The 3 – 4 a.m. hour went straight off the charts as Perseids were popping everywhere. Then, at 3:26 a.m. right in the middle of a nice burst of Perseids, we all saw an intense multiple flash occur along the southern horizon. It did not look like

distant “heat” lightning which we were also seeing at the time. We were sure it had been a sensational Perseid fireball that had occurred just over our horizon, maybe –10 or even brighter!

We were still hotly discussing that event when 17 minutes later at 3:53 a.m. we all saw it! “It” was a spectacular –7 fireball streaking across the eastern sky through Orion and Taurus going northeastward, lighting up the night. It lasted several seconds and popped and burst and flared in multicolors – blue, orange, yellow, red and turquoise. We all collectively went nuts! We gave it a standing ovation! It took us a while to calm back down after that! It was not even a Perseid, we think it might have been a South delta Aquariid, but it definitely was one of the best meteors I have ever seen on a meteor watch!

The Perseids then tried their best not to be outdone and they did a pretty darned good job of it! They still shot out the occasional –3 and –4 beauties, but it was in the amazing spurts of several Perseids occurring within seconds of each other that was so memorable! Several times we had two Perseids hit at exactly the same second and occasionally even three would hit simultaneously!

We went well into twilight during “bolide patrol” with bright Perseids hitting all around the sky and we soon had a –5 Perseid fireball shoot due south that left a long train hanging on the sky behind it! In and of itself, it would have been spectacular enough, but it paled somewhat to what we had seen earlier!

Here are my results from the incredible 5.5 hour session:

Observed for radiant:

- ERI – eta Eridanids
- ANT – Anthelions
- PER – Perseids
- SDA – South delta Aquariids
- PAU – Piscids Austrinids
- NDA – North delta Aquariids
- KCG – kappa Cygnids
- BPE – beta Perseids

Aug 11/12 2016, Observer: Paul Jones, Location: North Bank of Matanzas Inlet, Florida, Lat: 29.75N, Long: 81.24W (approximately 18 miles south of St. Augustine, Florida). LM: variable, 6.5 to 7.0 with cirrus haze intermittent about 20 to 25 % of sky at times, Facing west

12:00 – 1:00 a.m. EDT (0400 – 0500 UT)

- 21 Perseids
- 1 South delta Aquariid
- 1 North delta Aquariid
- 6 Sporadics
- 29 total meteors

1:00 – 2:00 a.m. EDT (0500 – 0600 UT)

- 47 Perseids: –3(2), –2(3), –1(3), 0(3), +1(6), 2(12), +3(11), +4(4), +5(3)
- 2 South delta Aquariids: +1, +2
- 1 kappa Cygnid +2
- 6 Sporadics +1, +2(2), +3, +4(2)
- 56 total meteors

2:00 – 3:00 a.m. EDT (0600 – 0700 UT)

- 63 Perseids: –4(2), –3, –2(3), –1(4), 0(9), +1(8), +2(15), +3(12), +4(5), +5(4)
- 3 South delta Aquariids: 0, +2, +3
- 1 eta Eridanid:
- 8 Sporadics +2(2), +3(2), +4(3), +5
- 75 total meteors

3:00 – 4:00 a.m. (0700 – 0800 UT)

- 78 Perseids: –3(2), –2(2), –1(4), 0(9), +1(12), +2(21), +3(15), +4(9), +5(4)
- 3 South delta Aquariids: –7, +2, +3
- 1 North delta Aquariid: +3
- 1 Anthelion: +3
- 1 beta Perseid: +2
- 9 Sporadics: +2(2), +3(3), +4(2), +5(2)
- 93 total meteors

4:00 – 5:00 a.m. (0800 – 0900 UT)

- 95 Perseids: –3, –2(3), –1(9), 0(13), +1(13), +2(22), +3(24), +4(8), +5(2)
- 2 eta Eridanids: +1, +3
- 1 South delta Aquariid: +1
- 1 beta Perseid +3
- 11 Sporadics: –2, +2(2), +3(4), +4(2), +5(2)
- 110 total meteors

5:00 – 5:30 a.m. (0900 – 0930 UT)

- 54 Perseids: –5, –3(2), –2(3), –1(5), 0(6), +1(9), +2(12), +3(9), +4(7)
- 5 Sporadic: 0, +2, +3, +4(2)
- 59 total meteors

Overall total: 5.5 hours, 422 total meteors (overall average of 76.7 meteors per hour). Total number of Perseids: 358 (overall Perseid hourly average: 65.1 per hour). I probably missed recording some meteors due to the excitement surrounding many of the ones we saw and/or they just plain hit so fast and/or too frequently in spurts to keep up with them all on data recording!

Of the 358 observed PERs, 117 left visible trains (32.7%). Several PER trains lasted anywhere from 1 to 7 seconds on the sky. Yellow and blue were the mostly observed PER colors.

A huge shout out goes to my fellow ACACers: Brenda Branchett, Skip Whitford, Lynne Pouliot, Beth Mansbridge, Jeff Corder, Basil Yothers and new member Jean Rahner for sharing this awesome experience, plus the

many guests we welcomed and “A.W.” a flounder fishermen who joined us for the watch and simply had the time of is life! I think we all may have...

More later as we will be out in the morning to monitor the post-max!!

2016 August 12–13, Perseids still popping like popcorn!

For what must surely be the umpteenth time in a row, I was able to get out at Matanzas Inlet (MI) for 3 1/2 more exquisite hours of Perseid meteor watching under the as always stunning MI skies. I was joined this morning by new friends Sara Clifton, “A. W.” and A. W.’s son Hunter for a very varied and intriguing morning of flounder gigging and meteor watching! Those are two past times rarely engaged in on the same night (as one requires looking down, the other: looking up...;o)!

Sara and I got there about 12:30 a.m. and with almost two hours to moon set, we quickly joined A. W. and Hunter out flounder gigging on the MI sand and mud flats. A. W. has a strong light he uses for spotting the elusive flounders and we followed them around the shallow water and flats, spotting blue crabs, sting rays, mullet and other estuarine marine critters. Several times we encountered schools of small mullet who bushed against our legs as the swam past us. A. W. and Hunter even caught some small flounder with their bare hands to show them to us. Neither Sara nor I had never petted a flounder before! Overall, it was a great experience!

I came up to the parking lot a bit before the others did and just as I got up to the car, I saw a flash on the ground. Looking up quickly, I caught the tail end of a beautiful, golden yellow delta Aquariid fireball of a least -5 magnitude streaking due north along the meridian. It must have lasted several seconds and covered a fair chunk of the entire sky. It was almost, but not quite, as awesome as the one last night! The time was 1:30 a.m. EDT.

I started in at 2:00 a.m. EDT and with Sara, A. W. and Hunter, watched another fine display of bright and colorful Perseids popping around the sky like popcorn. They hadn’t slacked off much and they were still doing the spurting thing as they had done the night before. Throw in some fine delta Aquariids, eta Eridanids and kappa Cygnids and it was a top notch meteor watch enjoyed with friends once again!

Here’s my results:

Observed for radiants:

- ERI – eta Eridanids
- ANT – Antheions
- PER – Perseids
- SDA – South delta Aquariids
- PAU – Piscids Austrinids
- NDA – North delta Aquariids
- KCG – kappa Cygnids

- BPE – beta Perseids

Aug 12/13 2016, Observer: Paul Jones, Location: North Bank of Matanzas Inlet, Florida, Lat: 29.75N, Long: 81.24W (approximately 18 miles south of St. Augustine, Florida). LM: 7.0, Clear, Facing west

2:00 – 3:00 a.m. EDT (0600 – 0700 UT)

- 35 PER: $-4, -2, -1(2), 0(4), +1(6), +2(9), +3(7), +4(4), +5$
- 2 SDA: $+2, +3$
- 5 NDA: $+1, +2(3), +3$
- 2 ERI: $+1, +3$
- 2 KCG: $+1, +4$
- 6 SPO: $+2(2), +3(2), +4(2)$
- 52 total meteors

3:00 – 4:00 a.m. EDT (07500 – 0800 UT)

- 49 PER: $-3, -2, -1(2), 0(5), +1(4), +2(10), +3(13), +4(10), +5(3)$
- 1 NDA: $+5$
- 7 SPO: $+2, +3(4), +4(2)$
- 57 total meteors

4:00 – 5:00 a.m. EDT (0800 – 0900 UT)

- 62 Perseids: $-4, -3(2), -2, -1(3), 0(5), +1(7), +2(10), +3(19), +4(10) +5(4)$
- 6 NDA: $+2, +3(4), +4$
- 2 SDA: $+3, +4$
- 1 ERI: $+2, +3(2)$
- 9 SPO: $+1, +2, +3(3), +4(4)$
- 82 total meteors

5:00 – 5:30 a.m. (0900 – 0930 UT)

- 37 Perseids: $-4, -3, -2, -1(2), 0(4), +1(6), +2(9), +3(8), +4(5)$
- 5 Sporadic: $0, +2, +3, +4(2)$
- 59 total meteors

Overall total: 3.5 hours, 231 total meteors (overall average of 66 meteors per hour). Total number of Perseids: 183 (overall Perseid hourly average: 52.3 per hour). I probably missed recording some meteors due to the excitement surrounding many of the ones we saw and/or they just plain hit so fast and/or too frequently in spurts to keep up with them all on data recording!

Of the 183 observed PERs, 55 left visible trains (30%). Several PER trains lasted anywhere from 1 to 7 seconds on the sky. Yellow and blue were the mostly observed PER colors.

Brenda Branchett also got out for two very productive hours down in Deltona, Florida, here is her report:

Greeting from Deltona, again!

Got out for two hours this morning to 4.5 – 5.5 magnitude skies. I did have some fast moving clouds that hampered my first hour for about 10 minutes.

Location: Deltona, Fl.

Sky coverage; 70 percent/ 4.5 – 5.0 magnitude

Time: 3:30 – 4:30 a.m.

- Total Perseids: 179
- Total meteors: 204
- Per: 85 (Two minus 4. Brighter members averaging minus 1 and 2, longer trains etched against the night sky. This hour I had 10 minutes of cloud which covered my sky.)
- Sporadic: 5
- SDA: 4
- KCG: 3
- Total : 97

Sky Conditions: 5.0–5.5 magnitude

Time: 4:30–5:30a.m.

- Per: 94 (One minus 4; most were in the minus 1, 2 and 3 range. a number of 2nd and 3rd magnitude)
- Sporadic: 7
- SDA: 4
- KCG: 2
- Total: 107

Overall, my impression is that they put on a better show than night before, my totals for the two hours proves that. Of course, sky conditions make a big difference and how alert the observer is!!!!

As you can tell from all these impressive numbers, we had quite a busy morning! A huge shout out to Sara Clifton, A. W. and Hunter, as well as Brenda in Deltona for getting out once again and keeping me awake and the ACAC at the forefront of amateur visual meteor astronomy!

2016 August 13–14, PERs still going!

Well, for the absolutely amazing twelfth morning in a row I was able to get for two more lovely hours of Perseid post max observing at Matanzas Inlet! This stretch of observing nights is by far a personal record for me, unprecedented in my entire 40+ years of meteor watching! To say I have been blessed would be the understatement of the year!

This time I was observing by myself, although I found at later, new ACAC friend A. W. was back out at the Inlet also, for more flounder fishing. The moon set at 0315 EDT and when I arrived about that time, the skies were mostly filled with cirrus clouds. Undaunted and with the confident swagger of recent successes, I settled back to watch anyway and lo and behold in less than 15 minutes, the sky was perfectly clear once again!

Predictably, the PERs had finally begun to wane somewhat off the peak, although they were still producing nicely in the inky black skies. All told, I pulled in 101 more meteors in the two hours (0325 – 0525 EDT) with 68 of them being PERs. I was better rested and far more alert this morning than yesterday morning and that helped a lot!

Here's my data:

Observed for radiant:

- ERI – eta Eridanids
- ANT – Antheions
- PER – Perseids
- SDA – South delta Aquariids
- PAU – Piscids Austrinids
- NDA – North delta Aquariids
- KCG – kappa Cygnids
- BPE – beta Perseids

Aug 13/14 2016, Observer: Paul Jones, Location: North Bank of Matanzas Inlet, Florida, Lat: 29.75N, Long: 81.24W (approximately 18 miles south of St. Augustine, Florida). LM: 7.0, Clear, Facing west (first hour), the east (second hour)

3:25 – 4:25 a.m. EDT (0725 – 0825 UT)

- 36 PER: –1, 0(2), +1(2), +2(8), +3(9), +4(9), +5(5)
- 3 NDA: +1, +3, +4
- 3 ERI: +3, +4, +5
- 1 KCG: +1
- 9 SPO: +1, +2, +3, +4(3), +5(3)
- 52 total meteors

4:25 – 5:25 a.m. EDT (0825 – 0925 UT)

- 32 PER: –2, –1(2), 0, +1(3), +2(9), +3(6), +4(8), +5(2)
- 5 ERI: +2(2), +3(2), +4
- 1 NDA: +3
- 10 SPO: +2, +3(2), +4(5), +5(2)
- 49 total meteors

Of the 68 observed PERs, 14 left visible trains (21%). As usual, yellow and blue were the most observed PER colors.

With the exception of the three nice ones in the second hour, overall the PERs were noticeably dimmer this morning with fewer trains. It was only my better alertness level that allowed me to catch some of the fainter ones. Gone also was the marvelous PER spurting behavior that had made previous two mornings so memorable.

Just as I was about to head out, I realized that a familiar truck was parked in the lot. It was new friend A. W. who was once again flounder fishing in the Inlet. I met up with him and helped him haul his catch of 8 large flounder to his truck. He told me he would have reached his “bag

limit” of ten fish, except that two of them jumped out of his bucket back into the Inlet! I thought at that point it it’s nice that meteor watchers don’t have to worry about that...;o).

Dare I should try to go for a thirteenth straight morning of observing tomorrow? The almost Full Moon is up until 0407 EDT, allowing another full hour and a half of dark skies afterward... to monitor the PER ramp down – hmmm, that may just indeed be too tempting for me to resist...;o). More later perhaps...;o)??

2 Meteor Observations from Southern California by Robert Lunsford

11 August 2016

I woke at 2330 PDT and looked outside at totally overcast skies. I couldn’t have been happier as I knew these low level clouds along the coast would act as a shield and provide me with darker skies from my mountain site some 80km east of San Diego. It took me 30 minutes to load the truck and I was on my way near midnight. The clouds began to break near the 600m marker and by another 300m it was totally clear. I saw my first meteor as I drove past my Alpine site, which has a great southern horizon but a poor northern one. I was driving to the western slopes of Mt. Laguna, overlooking the little town of Pine Valley. When I arrived there were scattered cars where people were hoping to catch a few meteors. The sky was perfectly clear and dark. There was still an obvious light dome 10 degrees high in the NW (Los Angeles). The San Diego light dome was effectively muted by the clouds but still there. The Milky Way could be traced down to about 10 degrees high above it. The eastern portion of the sky was awesome as the hills to the east blocked any light from the desert communities.

I started counting at 0100 PDT. There was a breeze out of the southeast which made the temperature of 19C seem a bit cooler. A blanket was needed to keep comfortable. The breeze was off and on all morning long. It never was bothersome and probably kept the mosquitoes away as I heard only 1 buzzer all morning long. There as no bothersome dew as the humidity was only 29%. Meteor activity generally increased as the morning progressed. I noticed a dip in the Perseid activity during the second hour but a surge in the sporadic activity made up for that. I was facing due north at an elevation of 50 degrees. The northern radiants were within my field of view plus I could distinguish those strikingly fast meteors shooting northward from Eridanus. The other southern radiants were way behind me so I couldn’t distinguish the activity from the CAP’S, ANT’S, or the SDA’S. Any meteor entering my field of view from the south and southwest was called a sporadic.

The first meteor of the night was a nice, bright and slow Kappa Cygnid. Unfortunately it would be the only one I would see. The Perseids did not impress me with bright meteors until the last hour before dawn. There were often long gaps in the activity which was frustrating. It just

made no sense at times to go 5 and 6 minutes without seeing a meteor under such splendid skies. I kept an eye out for possible beta Perseids and only recorded 2 possible members during my 3rd hour. The most impressive meteor of the night was not the brightest. It only peaked at 2nd magnitude but lasted several seconds as it slowly moved upward from the northern horizon and extinguished in Ursa Minor.

It was great to get out again under truly dark skies. It had been nearly 4 months since my last opportunity to view from here. The forecast appears promising for tonight so I look forward to seeing many more meteors.

- Observer: Robert Lunsford (LUNRO)
- Date: 16-Aug 11 Mean Solar Long: 138.394
- Beginning Time (UT) 0800 Ending Time (UT) 1200
- Total T_{eff} : 4.00
- LOCATION: Pine Valley Viewpoint, CA, USA
- LONG: 116 29’ 43” W LAT: 32 49’ 49” N
- Elevation: 1300m Bortle Scale: Class 3: Rural Sky
- Beginning Temperature/Relative Humidity: 19-29%
- Ending Temperature/Relative Humidity: 17-44%
- METHOD: Visual Recording on Tape

Showers Observed

- BPE 03:16 (049°) +37°, 00-00-02-00: 2 Total
- ERI 03:00 (045°) –10°, 01-03-03-03: 10 Total
- KCG 18:20 (275°) +55°, 01-00-00-00: 1 Total
- PER 03:08 (047°) +57°, 24-22-27-37: 110 Total
- SPO 04-16-11-13 44 Total

Hourly Counts: 30-41-43-53, 167 Total

Period 1 0800 – 0900 UT

- F = 1.00 (0% Clouds) Mean LM 6.72
- FOV 330 +70 TOTAL T_{eff} : 1.00
- Mean Solar Long: 138.866
- Meteor Data BPE 0, ERI 1, KCG 1, PER 24, SPO 4 TOTAL 30

Magnitude Distribution

- ERI +2 (1) Mean +2.00
- KCG +1 (1) Mean +1.00
- PER –1 (2) 0 (2) +1 (2) +2 (7) +3 (5) +4 (4) +5 (2) Mean +2.29
- SPO –1 (1) +2 (1) +4 (2) Mean + 2.25

Period 2 0900 – 1000 UT

- F = 1.00 (0% Clouds) Mean LM 6.63
- FOV 345 +70 TOTAL T_{eff} : 1.00
- Mean Solar Long: 138.906
- Meteor Data BPE 0, ERI 3, KCG 0, PER 22, SPO 16 TOTAL 41

Magnitude Distribution

- ERI +2 (2) +3 (1) Mean +2.33

- PER -3 (1) 0 (1) +1 (6) +2 (5) +3 (4) +4 (4) +6 (1)
Mean +2.14
- SPO +1 (1) +2 (2) +3 (6) +4 (5) +5 (2) Mean +3.31

Period 3 1000 – 1100 UT

- F = 1.00 (0% Clouds) Mean LM 6.55
- FOV 000 +70 TOTAL T_{eff} : 1.00
- Mean Solar Long: 138.946
- Meteor Data: BPE 2, ERI 3, KCG 0, PER 27, SPO 11
TOTAL 43

Magnitude Distribution

- BPE +3 (1) +5 (1) Mean +4.00
- ERI 0 (1) +1 (1) +3 (1) Mean +1.33
- PER -1 (1) 0 (3) +1 (3) +2 (7) +3 (6) +4 (5) +5 (2)
Mean +2.37
- SPO 0 (1) +1 (1) +3 (2) +4 (6) +6 (1) Mean +3.36

Period 4 1100 – 1200 UT

- F = 1.00 (0% Clouds) Mean LM 6.40
- FOV 015 +70 TOTAL T_{eff} : 1.00
- Mean Solar Long: 138.986
- Meteor Data: BPE 0, ERI 3, KCG 0, PER 37, SPO 13
TOTAL 53

Magnitude Distribution

- ERI +1 (1) +2 (2) Mean +1.67
- PER -5 (1) -4 (1) -2 (1) -1 (2) 0 (1) +1 (5) +2 (7) +3 (11) +4 (8) Mean +1.92
- SPO +1 (2) +2 (4) +3 (3) +4 (3) +6 (1) Mean +2.85

Total Magnitude Distribution

- BPE +3 (1) +5 (1) Mean +4.00
- ERI 0 (1) +1 (2) +2 (5) +3 (2) Mean +1.80
- PER -5 (1) -4 (1) -3 (1) -1 (5) 0 (7) +1 (16) +2 (26) +3 (26) +4 (21) +5 (4) +6 (1) Mean +2.15
- SPO -1 (1) 0 (1) +1 (4) +2 (7) +3 (11) +4 (16) +5 (2) +6 (2) Mean +3.09

12 August 2016 Meteor Observations from Southern California

During Thursday afternoon there was a surge of tropical moisture into the area. When this moisture rose over the mountains it created towering cumulus clouds. Luckily, this was not a strong surge and these clouds dissipated soon after sundown. The moisture also disrupted the marine layer and the low level stratus that blocked a lot of city lights the night before was not present tonight. When I arrive at my viewing site near 11:30pm PDT, it was full of cars and I was lucky to find my favorite parking site still unoccupied. The traffic driving up the curving mountain road was non-stop most of the night. I usually have only 1-2 cars pass all night long!

I had to face half-way up toward the south to avoid the headlights. The sky was impressive but there was a layer of haze 20 degrees high in all directions. It was especially bad in the west toward San Diego plus the waxing gibbous moon was in that direction during my first hour of

viewing. The humidity was much higher tonight and the limiting magnitude as not quite as good as it had been the previous night. By facing south I could not distinguish the beta Perseids from the much more numerous regular ones. I could have probably seen any kappa Cygnids had they shot my way, but none did.

The first hour was good considering the moon was still bright for most of it. At 12:42 I saw a bright flash reflected in the back window of my truck. I turned around in time to see a fading Perseid train. The crowd enjoyed that one but really went nuts two minutes later when a slow Antheion fireball shot through Aquarius and Pisces and disappeared just over the hill toward the east. Now I did catch that meteor and it was awesome! It peaked at an estimated magnitude -8 and actually split in two before extinguishing. The most impressive feature was the strong aqua color and golden sparks that were present.

Once the moon set near 1am PDT, the activity seemed to kick into high gear. There were moments when 2-3 Perseids were visible within seconds. There were also lulls in the action but rarely did more than 2 minutes pass without seeing a meteor. The second and third hour produced about a Perseid a minute. The fourth really kicked into high gear as 93 Perseids were seen during that hour. It's interesting to note that the last minute of this hour produced 7 Perseids while the first minute of the next hour produced none! The brightest Perseids of the night, magnitudes -6 and -5, also occurred within two minutes of each other during this strong period.

Overall, it was the most satisfying Perseid display I have seen since the 1990's. I was glad to get the time off from work and although I lost two days of wages, it was still well worth it!

- Observer: Robert Lunsford (LUNRO)
- Date: 16-Aug 12 Mean Solar Long: 139.866
- Beginning Time (UT) 0700 Ending Time (UT) 1200
- Total T_{eff} : 5.00
- LOCATION: Pine Valley Viewpoint, CA, USA
- LONG: 116 29' 43" W LAT: 32 49' 49" N
- Elevation: 1300m Bortle Scale: Class 4: Rural/suburban transition
- Beginning Temperature/Relative Humidity: 20-64%
- Ending Temperature/Relative Humidity: 18-75%
- METHOD: Visual Recording on Tape

Showers Observed

- ANT 22:08 (332°) -12°, 03-02-00-02-00: 7 Total
- ERI 03:04 (046°) -09°, 00-00-01-02-01: 4 Total
- PER 03:12 (048°) +58°, 25-57-60-93-67: 302 Total
- SDA 23:32 (353°) -12°, 00-02-00-04-00: 6 Total
- SPO 03-03-04-12-04: 26 Total

Hourly Counts: 31-64-65-113-72, 345 Total

Period 1 0700 – 0800 UT

- F = 1.00 (0% Clouds) Mean LM 6.18

- FOV 315 +00 TOTAL T_{eff} : 1.00
- Mean Solar Long: 139.786
- Meteor Counts: ANT 3, ERI 0, PER 25, SDA 0, SPO 3 TOTAL 31

Magnitude Distribution

- ANT –8 (1) +2 (2) Mean –1.33
- PER +1 (2) +2 (5) +3 (7) +4 (10) +5 (1) Mean +3.12
- SPO +2 (1) +3 (1) +5 (1) Mean + 3.33

Period 2 0800 – 0900 UT

- F = 1.00 (0% Clouds) Mean LM 6.45
- FOV 330 +00 TOTAL T_{eff} : 1.00
- Mean Solar Long: 139.826
- Meteor Counts: ANT 2, ERI 0, PER 57, SDA 2, SPO 3 TOTAL 64

Magnitude Distribution

- ANT 0 (1) +3 (2) Mean +1.50
- PER –2 (1) –1 (1) 0 (2) +1 (11) +2 (16) +3 (9) +4 (9) +5 (8) Mean +2.51
- SPO +2 (1) +3 (1) +4 (1) Mean + 3.00

Period 3 0900 – 1000 UT

- F = 1.00 (0% Clouds) Mean LM 6.50
- FOV 345 +00 TOTAL T_{eff} : 1.00
- Mean Solar Long: 139.866
- Meteor Counts: ANT 0, ERI 1, PER 60, SDA 0, SPO 4 TOTAL 65

Magnitude Distribution

- ERI +2 (1) Mean +2.00
- PER –3 (1) –1 (1) 0 (4) +1 (17) +2 (11) +3 (17) +4 (7) +5 (2) Mean +2.07
- SPO +1 (1) +2 (2) +4 (1) Mean +2.25

Period 4 1000 – 1100 UT

- F = 1.00 (0% Clouds) Mean LM 6.45
- FOV 000 +00 TOTAL T_{eff} : 1.00
- Mean Solar Long: 139.906
- Meteor Counts: ANT 2, ERI 2, PER 93, SDA 4, SPO 12 TOTAL 113

Magnitude Distribution

- ANT +3 (2) Mean +3.00
- ERI +2 (1) +3 (1) Mean +2.50
- PER –6 (1) –5 (1) 0 (4) +1 (16) +2 (27) +3 (25) +4 (15) +5 (4) Mean +2.30
- SPO 0 (1) +1 (1) +2 (2) +3 (3) +4 (4) +5 (1) Mean +2.92

Period 5 1100 – 1200 UT

- F = 1.00 (0% Clouds) Mean LM 6.27
- FOV 015 +00 TOTAL T_{eff} : 1.00
- Mean Solar Long: 139.946
- Meteor Counts: ANT 0, ERI 1, PER 67, SDA 0, SPO 4 TOTAL 72

Magnitude Distribution

- ERI 0 (1) Mean 0.00
- PER –1 (1) 0 (4) +1 (13) +2 (14) +3 (19) +4 (14) +5 (2) Mean +2.43
- SPO +3 (1) +4 (2) +5 (1) Mean +4.00

Total Magnitude Distribution

- ANT –8 (1) 0 (1) +2 (2) +3 (3) Mean +0.71
- ERI 0 (1) +2 (2) +3 (1) Mean +1.75
- PER –6 (1) –5 (1) –3 (1) –2 (1) –1 (3) 0 (14) +1 (59) +2 (73) +3 (77) +4 (55) +5 (17) Mean +2.39
- SPO 0 (1) +1 (2) +2 (6) +3 (6) +4 (8) +5 (3) Mean +3.04

Meteor Observations from Southern California 31 Aug 2016

I had an unexpected night off of work so I thought I would take advantage of the clear skies and try to view some meteors. After a 3 hour nap I woke and headed east to darker skies. Unfortunately the sky was clear all the way to the coast so the skies from my mountain site was not a good as it could have been. The previous night had a thick blanket of fog covering the city which I could have used this morning. Still, a limiting magnitude of +6.5 only 50 miles from a city of over 1 million people is not too bad! I faced due north to concentrate on the Aurigids. Activity was about what I expected. I never have seen many AUR's on August 31st no matter the predicted date of maximum. September 1st has always been the best morning. This morning was no different even though the first meteor of the night was a nice magnitude 2 AUR skimming the northern horizon. I didn't see another AUR all night long. I did notice 3 meteors that intersected near 4:40 (070°) +48°, which is close to the old position listed for the AUR's. The current AUR radiant lies close to theta Auriga, on the eastern portion of the constellation. It would be interesting to hear what others saw.

Totals were low for the other sources as they were nowhere near maximum. Sporadic activity was good with a couple of bright meteors seen during the second hour. The highlight of the night was a long –1 sporadic that shot out of Monoceros heading overhead. The last hour was cut short due to clouds. These alto cumulus appeared over the eastern horizon near 0500 local time and were overhead 15 minutes later. Still, it was a nice getaway and I enjoyed the nice, warm breeze off the desert that made viewing quite comfortable.

Well, it's back to work tonight. Perhaps I'll have another opportunity to view again next week?

- Observer: Robert Lunsford (LUNRO)
- Date: 16-Aug-31 Mean Solar Long: 158.227
- Beginning Time (UT) 0930 Ending Time (UT) 1217
- Total T_{eff} : 2.78
- LOCATION: Pine Valley Viewpoint, CA, USA
- LONG: 116 29' 43" W LAT: 32 49' 49" N
- Elevation: 1300m Bortle Scale: Class 4: Rural/suburban transition

- Beginning Temperature/Relative Humidity: 73 (23C) – 30%
- Ending Temperature/Relative Humidity: 72 (22C) – 29%
- METHOD: Visual Recording on Tape

Showers Observed

- August Gamma Cepheids (AGC) 00:08 (002°) +77°, 00-01-00: 1 Total
- Anhelion (ANT) 23:20 (350°) –05°, 02-00-00: 2 Total
- Aurigids (AUR) 06:02 (091°) +39°, 01-00-00: 1 Total
- Northern Delta Aquariids (NDA) 00:05 (001°) +08°, 00-01-01: 2 Total
- Orionids (ORI) 03:52 (058°) –01°, 00-00-01: 1 Total
- Sporadics (SPO) 09-12-07: 28 Total

Hourly Counts: 12-14-09, 35 Total

Period 1 0930 – 1030 UT

- F = 1.00 (0% Clouds) Mean LM 6.49
- FOV 015 +60 TOTAL T_{eff} : 1.00
- Mean Solar Long: 158.195
- Meteor Counts: ANT 2, AUR 1, SPO 9 TOTAL 12

Magnitude Distribution

- ANT +4 (2) Mean +4.00
- AUR +2 (1) Mean +2.00
- SPO +2 (1) +3 (5) +5 (2) +6 (1) Mean + 3.67

Period 2 1030 – 1130 UT

- F = 1.00 (0% Clouds) Mean LM 6.46
- FOV 030 +60 TOTAL T_{eff} : 1.00
- Mean Solar Long: 158.236
- Meteor Counts: AGC 1, NDA 1, SPO 12 TOTAL 14

Magnitude Distribution

- AGCT +3 (1) Mean +3.00
- NDA +4 (1) Mean +4.00
- SPO 1 (1) 0 (1) +1 (1) +2 (3) +3 (3) +4 (1) +5 (2) Mean +2.42

Period 3 1130 – 1217 UT

- F = 1.33 (25% Clouds) Mean LM 6.21
- FOV 045 +60 TOTAL T_{eff} : 0.78
- Mean Solar Long: 158.387
- Meteor Counts: NDA 1, ORI 1, SPO 7 TOTAL 9

Magnitude Distribution

- NDA +2 (1) Mean +2.00
- ORI +4 (1) Mean +4.00
- SPO +2 (1) +3 (2) +4 (3) +5 (1) Mean +3.57

Total Magnitude Distribution

- AGC +3 (1) Mean +3.00
- ANT +4 (2) Mean +4.00

- AUR +2 (1) Mean +2.00
- NDA +2 (1) +4 (1) Mean +3.00
- ORI +4 (1) Mean +4.00
- SPO –1 (1) 0 (1) +1 (1) +2 (5) +3 (10) +4 (4) +5 (5) +6 (1) Mean +3.11

3 September reports by Paul Jones

The September epsilon Perseids put on a show!

Well, for the last three mornings, fellow ACACer Brenda Branchett and I have been witness and privy to a very unexpected treat in the pre-dawn sky! We were out to monitor a relatively obscure and little known minor meteor shower called the September epsilon Perseids (SPEs), a radiant that has been known to flash some unusual outbursts in recent years and it certainly appears they may have had one this year as well!

Brenda led the way on the morning of Sept. 7/8 catching 15 SPEs in an hour from her home in Deltona. I had been out earlier in the evening trying to observe from Matanzas Inlet, but was driven away by the same relentless swarms of “no-see-um” gnats that plagued us last month during our Perseid watches. They were much worse this month! It must be a late summer seasonal thing down there. I relocated the last two mornings to other sites.

On Sept 8/9 morning, I went back to Butler Beach near ACAC member Lyle Guzman’s home where we have had ACAC star parties and had an hour and a half of comfortable observing (no gnats) next to the ocean and confirmed Brenda’s impression of the SPE’s activity level from the previous morning. I even caught glimpse a –4 SPE fireball low in the east out over the ocean while walking out to the beach! Brenda continued her good results for them also. We compared notes and impressions by cell phone while observing.

Then this morning, Sept. 9/10, I re-ventured out to the Hastings, Florida area (Deep Creek Conservation Area) potato fields and enjoyed two glorious hours of fog-free, gnat-free and mostly mosquito-free observing. Both Brenda, down in Deltona, Florida and me at Hastings, once again saw very impressive SPE activity indeed!

Here’s Brenda’s data from recent mornings:

Date: September 7/8, 2016

Observer: Brenda Branchett, Location: Deltona, Florida

Sky conditions: 4.5–5.0 mag visible/70 percent of sky visible

Time: 4-25-5:25 a.m.

- Ep Perseids: 15 (Had one minus 1 and one minus 3, a couple of 1st and 0 mag, rest were 2nd or third.)
- Sporadics: 6
- Total: 21
- Satellites: 2 (One was a very slow moving)

Date: Friday, September 8/9, 2016

Observer: Brenda Branchett, Location: Deltona, Florida

Time: 4:30 – 5:15 a.m.

Sky conditions: 4.5 – 5.0 magnitude, 70 percent sky visible

- E. Per: 6 (Nothing brighter than 1st magnitude)
- Sporadic: 8
- Total:14

Date: Saturday, September 9/10, 2016

Observer: Brenda Branchett, Location: Deltona, Florida

Time: 4:30 – 5:30 a.m.

Sky conditions: 4.5 mag. A bit of haze, 60 percent sky visible

- E. Per: 8 (Nothing brighter than 1st magnitude)
- Sporadics: 5
- ANT: 1
- Total: 14

And here is my data:

Observed for radiants:

- SPE – September epsilon Perseids
- ORI – Orionids
- ATR – Aries-Triangulids
- ANT – Anthelions

September 8/9 2016, observer: Paul Jones, Location: Butler Beach, Florida (about three miles south of St. Augustine, Beach, Florida), Lat: 29.79 N, Long: 81.26 W., LM: 6.05, cloud interference 20%, Facing: east

0330 – 0500 EDT (0730 – 0900 UT), T_{eff} : 1.5 hours, No breaks

- 7 SPE: –4, +1, +2, +3(3), +4

- 2 ANT: +1, +3
- 1 ORI: +3
- 16 SPO: –1, +1, +2(5), +3(7). +4(2)
- 26 total meteors

7 of the 26 meteors left trains, the –4 SPE train lasted five seconds on the sky and the –1 SPO train lasted three seconds on the sky.

September 9/10 2016, observer: Paul Jones, Location: Deep Creek Conservation Area, Hastings, Florida (about 15 miles SW of St. Augustine, Florida), Lat: 29.69 N, Long: 81.44 W., LM: 6.5, clear, Facing: east

0330 – 0430 EDT (0730 – 0830 UT), T_{eff} : 1.0 hour, No breaks

- 6 SPE: 0, +3, +4(3), +5
- 2 ORI: +1, +4
- 1 ANT: +3
- 11 SPO: 0, +2, +3(6). +5(3)
- 20 total meteors

5 of the 20 meteors left trains, 2 SPEs, 1 ORI and 1 SPO.

0430 – 0530 EDT (0830 – 0930 UT), T_{eff} : 1.0 hour, No Breaks

- 10 SPE: +1, +2(3), +3(4), +4, +5
- 2 ORI: 0, +3
- 1 ANT: +3
- 1 ATR: 0
- 14 SPO: 0, +1(3), +3(4). +4(4), +5(2)
- 28 total meteors

7 of the 28 meteors left trains, four SPEs, 1 ORI and 2 SPOs.

It was indeed quite a surprise to see all those SPEs and it was awesome to see where the CAMS Benelux folks were able to view and to confirm Brenda's and my impressions of the SPEs. Teamwork is an awesome thing!

Enhanced Perseid activity 11-12 August

Paul Roggemans

Pijnboomstraat 25, 2800 Mechelen, Belgium

paul.roggemans@gmail.com

Immediately after the observations of enhanced Perseid activity caused when Earth crossed some predicted dust trails, first impressions were shared on social media. The author collected a few of these early reports.

1 Introduction

The first impressions of the 11-12 August Perseids were shared via Facebook. We give here some citations from observers who were lucky to watch the 11-12 August Perseid activity.

2 Some first impressions

Koen Miskotte: “Brilliant Perseid outburst. 15 fireballs between -4 and -8 . 3×-8 . Two peaks around $23^{\text{h}}15^{\text{m}}$ and possibly at $2^{\text{h}}15^{\text{m}}$ UT. Observed about 600–900 meteors. I don’t know. Maybe more.... We had unexpected very clear weather with lm up to $+6.8$. Man man man what a show. The best one since 2001.....”

Casper ter Kuile: “Perhaps we did not observe such a nice fireball show but activity was much higher than expected. The first peak we acknowledge but as the radiant was quite low at the sky on La Palma this was not well defined. The second was much more obvious but if we can narrow it to $02^{\text{h}}15^{\text{m}}$ UT. But this is all very preliminary.”

Mariusz Wisniewski posted on Facebook: “Perseids! Within minutes I could see even 7 meteors! We have seen very many bright meteors. There were also several spectacular cases. For example, this time from 1:58 which is slightly weaker from glitter bright moon the whole box!”

Jure Atanackov: “Huuuge Perseid outburst observed!!! Rates the best since Leonid storm in 2002!!! Wow!!!!!!”

Karl Antier: “Perseids were sometimes even more active than the last outburst I observed, the 2011 Draconids!”

Martin Popek posted impressive pictures on spaceweathergallery.com (see *Figure 1*). In his comment: “Over a thousand by a meteor, clear bolides and multiple when the camera caught per seconds 2-6 meteors.”



Figure 1 – Perseids 11-12 August 2016 by Martin Popek, IAP CAS Prague, station Nydek.

Japanese observers *Hiroshi Ogawa* and *Hirofumi Sugimoto* were the first to publish a reliable activity profile online (see *Figure 2*).

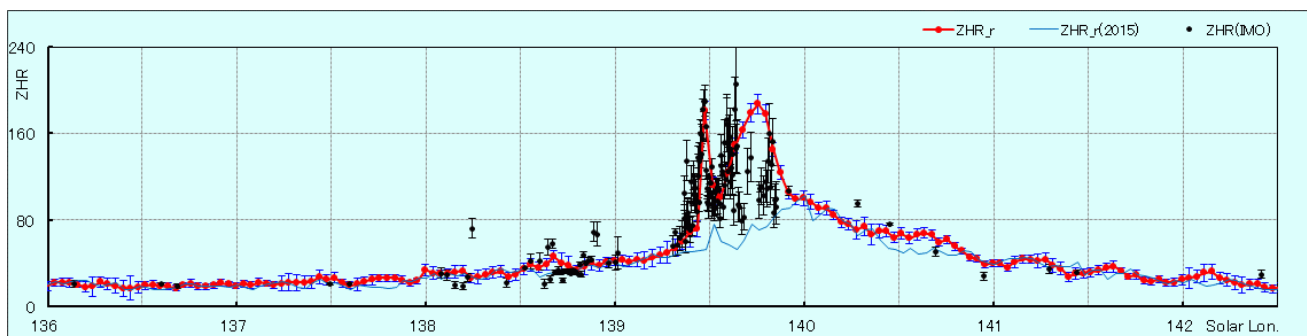


Figure 2 – Japanese radio observers were the first with a reliable activity profile online: <http://www5f.biglobe.ne.jp/~hro/Flash/2016/PER/index.html>.

CAMS Mechelen 12-13 Aug 2016: 686 meteors on 4 cameras!

Paul Roggemans

Pijnboomstraat 25, 2800 Mechelen, Belgium
paul.roggemans@gmail.com

The night of the traditional Perseid maximum was perfectly clear for the CAMS@Benelux network. The author captured a record number of meteors on 4 cameras. An overview is given of the brightest and most peculiar images obtained.

1 Introduction

Although the summer months in general offer the largest number clear nights of the year in Belgium and the Netherlands, getting a clear night right at the maximum of the Perseids requires a lot of good luck. The author often wondered how many meteors the 4 Watec cameras would capture if the maximum night would have clear sky. In 2016 we finally got 12-13 August perfectly clear and the answer to the question: as many as 686 meteors were confirmed on the video detections.

Of these 686, for the period 22^h till 02^h Ut I got the following single station radiant association: 3 SDA, 2 Cap, 4 SIA, 1 NDA, 6 KCG and 2 NIA. As for Perseids I list them per hour interval (UT) (see also *Figure 1*):

- 22^h – 23^h 48 Pers
- 23^h – 00^h 67 Pers
- 00^h – 01^h 86 Pers
- 01^h – 02^h 75 Pers

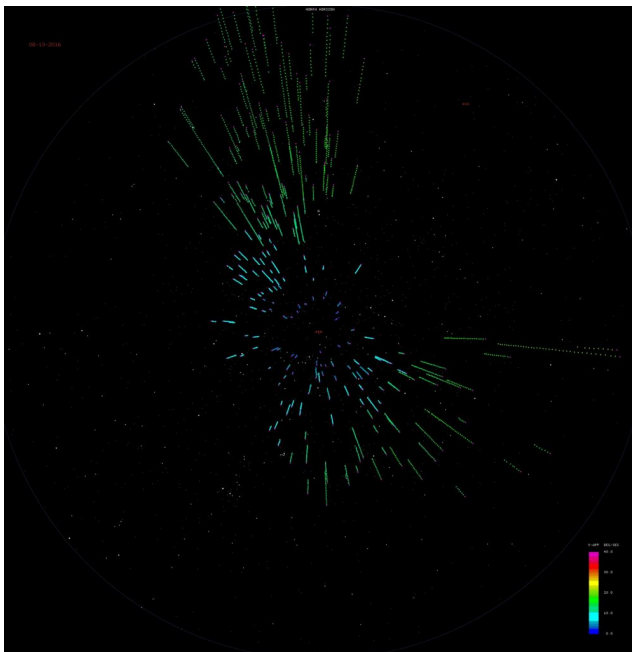


Figure 1 – Perseid meteor trails plotted in gnomonic projection for CAMS 383, 384, 388 and 389, 12-13 August 2016, 22h – 02h UT..

2 Peculiar pictures from 12-13 August 2016

A few examples of Perseids on the CAMS system. Not all meteors fit the quality criteria to obtain a good quality orbit and these are rejected from the coincidence list of multiple station meteors, although captured at other stations. The reason for rejection is either too poor accuracy in the position or unfavorable geometrics.



Figure 2 – Perseid captured on CAMS 383 on 2016 Aug. 12 at 22h03m00.64s UT, also captured by CAMS 348 (Heesch, NI), 371 (Leiden, NI) and 395 (Dourbes, B).



Figure 3 – Two Perseids in Perseus on CAMS 384, one at 2016 Aug. 12 22^h44^m29.89^s UT also captured by CAMS 372 (Leiden, NI), 320 and 321 (Hengelo, NI). The other at 22^h44^m34.99^s UT also captured by CAMS 312 (Gronau, D), 361 (Alphen a/d Rijn), 327 (Hengelo, NI) and 372 (Leiden, NI).



Figure 4 – Perseid south of Beta Umi 2016 Aug. 13 01^h01^m35.47^s UT on CAMS 389, 6-multaneous with CAMS 323 (Hengelo, NI), 382 (Wilderen, B), 341 (Ooltgenplaat, NI), 332 (Oostkapelle, NI) and 396 (Gent, B).



Figure 5 – Two Perseids in a single 10,2 second video registration on CAMS 389. One of both appeared 2016 Aug. 13 at 01^h30^m28.74^s and was also captured by CAMS 382 (Wilderen, B), 396 (Gent, B) and 343 (Ooltgenplaat, NI). The second meteor (at the edge) was probably rejected as the measured position did not fit the quality criteria for an orbit calculation.



Figure 6 – Peculiar shaped Perseid captured on CAMS 388, on 2016 Aug. 13 01^h46^m02.75^s UT. Also captured by CAMS 382 (Wilderen, B), 323 (Hengelo, NI), 332 (Oostkapelle, NI) and 396 (Gent, B).



Figure 7 – Two Perseids east of Auriga on 2016 Aug. 13 within 10 seconds after 02^h12^m49^s UT, none of both fitting criteria to obtain a good quality orbit.



Figure 8 – Perseid in Auriga on 2016 Aug. 13 02^h15^m41.57^s UT on CAMS 384 also captured on CAMS 327 (Hengelo, NI), 372 (Leiden, NI) and 315 & 316 (Gronau, D).

Activity of the September Perseids

Carl Johannink

The CAMS_BeNeLux network caught the activity of the September Perseids right from the start on September 6th.

Figure 1 and 2 show the radiant positions of simultaneously observed meteors by our team in that part of the sky between September 1–5 (Figure 1) and the night September 6/7 (Figure 2).

time of year, I plotted Figure 2 once again, but radiants colored in groups of same inclination: see Figure 3.

So there is no doubt that the meteors appearing from ~ RA=45 deg and DE=40 deg, are indeed September Perseids.

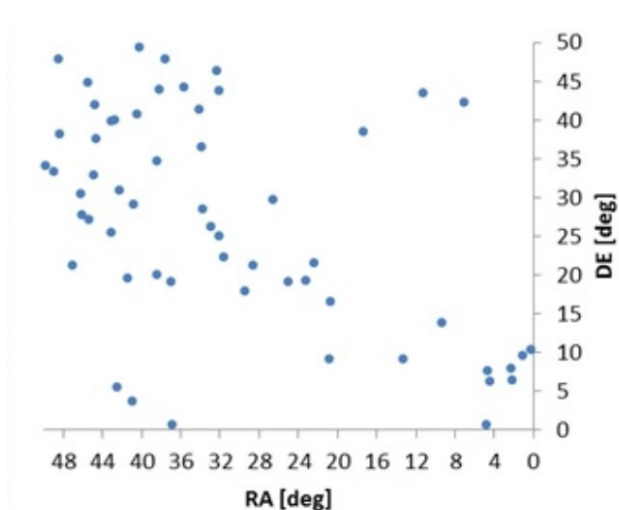


Figure 1 – Radiant positions in the sky between RA [0;50) and DE [0;50].

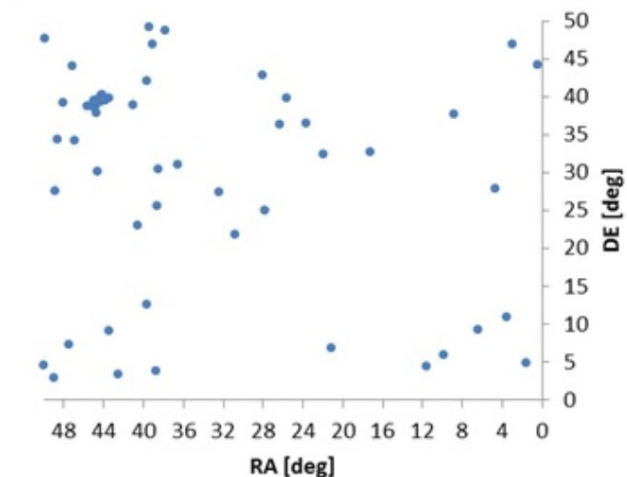


Figure 2 – Radiant positions in the same part of the sky on Sep 6/7.

To exclude the sporadic source, which is very active this

I want to thank all participants in the CAMS_BeNeLux network for the quick reduction of their data.

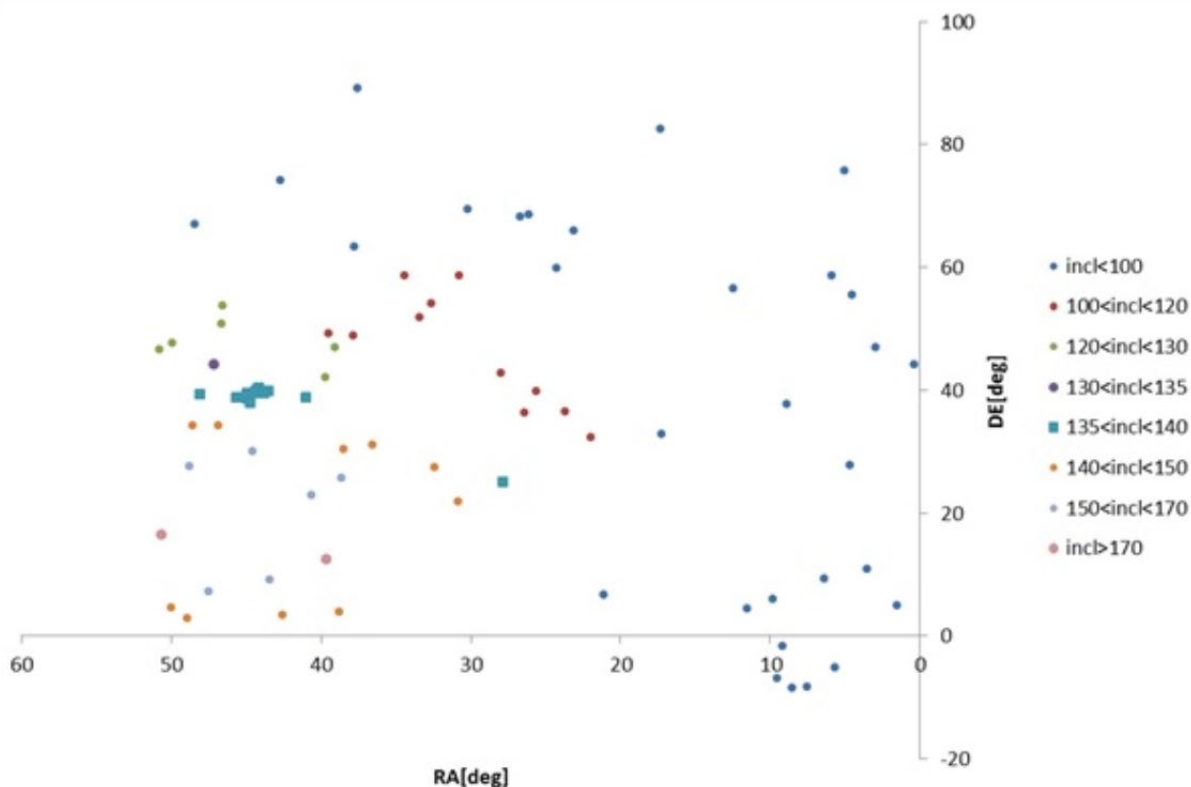


Figure 3 – Same as Figure 2; radiants now divided in groups with same inclination

CAMS 2016 activity: from heaven to hell and back to heaven

Paul Roggemans

Pijnboomstraat 25, 2800 Mechelen, Belgium
paul.roggemans@gmail.com

After October 2015 the typical poor weather season of autumn and winter months limited the monthly number of orbits collected by CAMS@Benelux. The first months the weather was definitely less cooperative compared to one year before and it got worse until mid-May to July when CAMS Benelux faced its worst time weather wise. August 2016 compensated the bad results for previous months with a record number of clear nights and orbits collected. The maximum night of the Perseids, 12-13 August, will remain a legendary night for years to come with as many as 830 orbits collected in a single night. End 2015 the global CAMS database contained over 340000 orbits and will grow with over 100000 orbits per year from 2016 onwards.

1 Introduction

End 2015 CAMS@Benelux had collected a grand total of 35310 orbits, a much better result than what any participant had ever expected. The unstable climate of the West European Low Lands isn't favorable for amateur astronomy and that also applies to CAMS. The CAMS network exceeds all expectations in the number of nights that the network can collect orbital data as well as by the number of simultaneous meteors captured in a single clear night without any significant shower activity.

The Watec cameras prove to be exceptionally suitable to deal with light pollution, even a Full Moon barely hampers to capture large numbers of meteors. Almost completely overcast nights with just some small periods of clear sky prove sufficient to still capture few simultaneous meteors. The use of AUTO-CAMS which operates the cameras all nights regardless the weather as well as the perseverance of the CAMS operators explain why during so many nights meteors can be recorded.

2 First 6 months of 2016: from heaven to hell

With more cameras and extra stations only the weather could prevent to do better than in 2015 and unfortunately the weather did that. January 2016 yielded 1037 orbits captured in 25 nights, a better result than in 2015 (880 orbits in 22 nights) and the 10 extra cameras explain this better result. Also February 2016 performed still well with 1075 orbits in 24 nights (777 orbits in 21 nights in 2015). March 2016 failed to do better than a year before with only 856 orbits in 23 nights (1033 orbits in 23 nights in 2015) and also April 2016 did worse than in 2015 with 971 orbits in 26 nights (1212 orbits in 27 nights in 2015). A series of clear nights during the Eta Aquariids activity contributed the bulk of the monthly result for May 2016 with 803 orbits in 26 nights, the best month of May for CAMS so far (in 2015 only 484 orbits were collected in 25 nights). *Figure 1* gives an overview of the very variable weather and its effect on the number of orbits collected. May-June-July prove to be the more difficult months with

poor weather combined with very short nights at 50° to 53° Northern latitude.

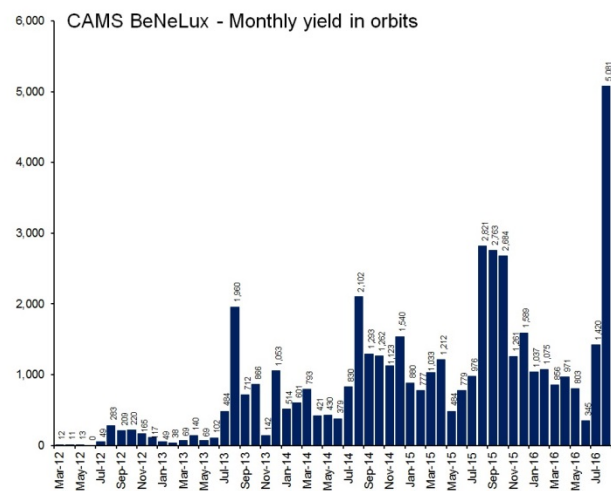


Figure 1 – the monthly number of orbits collected by CAMS@Benelux.

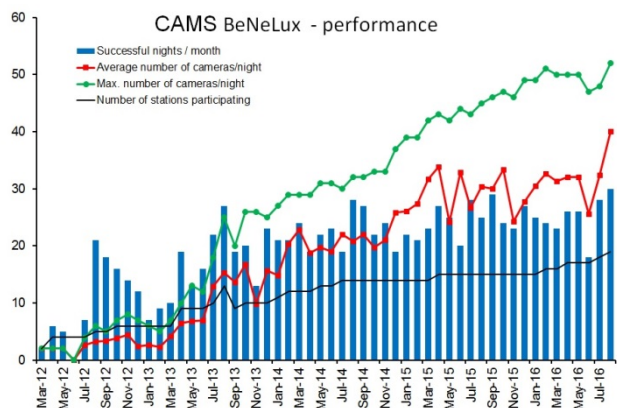


Figure 2 – The evolution of the number of nights per month that yield orbits (blue bars), number of stations (black line), average number of cameras active per night (red line), and maximum number of cameras active (green line).

From mid-May 2016 it were the pluviometers that broke all records, overcast, grey weather with mainly completely cloudy nights kept the number of orbits for June 2016 very low with as little as 345 orbits in 18 nights (779 orbits in

20 nights in 2015). In general the weather wasn't favorable for CAMS@Benelux in the first 6 months of 2016. In this 6-month period 5087 orbits were collected, a bit less than the 5165 orbits for the same period in 2015, obtained in 2015 with fewer cameras and less stations. In *Figure 2* you can see how the number of available cameras continues to increase (the green line) while the average number of cameras that manage to collect orbits remains stable at the same level for many months with the weather being responsible for the less favorable circumstances.

A few milestones: End of May 2016 the *40000th orbit* was registered by CAMS@Benelux and the poor month of June produced the *5000nd orbit of 2016*. 24 on 25 June was the *1000th night* with successfully recorded orbits since the start of the network in March 2012.



Figure 3 – The participating stations of the CAMS@BeNeLux network in August 2016.

3 July and August 2016: back from hell to heaven

The period with exceptional bad weather that started about mid-May and ruined most of June also continued into July 2016, clear nights remained rare, but 28 of the July nights allowed some parts of the CAMS network to function and to sample orbits. Stable good weather arrived on time for the Perseids 2016 with from 3-4 August onwards all nights clear sky except for a few partly cloudy nights. Unfortunately 11-12 August was mostly cloudy so that CAMS@Benelux missed most of the predicted Perseid outburst that night. This was compensated by a perfect clear sky for the traditional Perseid maximum 12-13 August. Being for more than 40 years involved with

meteor observing I can remember only very few years that allowed observing 12-13 August. The exceptional good circumstances of 2016 are something of a once in a lifetime in our climate. An absolute record of 830 orbits was collected in a single night. Several other August nights produced over 200 orbits per night making a grand total for August 2016 of 5081 orbits collected in a single month. *Figure 1* illustrates well how August 2016 outnumbers all previous months. August 2016 will remain for long a legendary month and its results will be very difficult to beat, even with a significant increase in the number of cameras.

23-24 August 2016 had the *10000nd orbit of 2016* registered. With this most successful month ever following immediately after the worst period with bad weather, the contrast could not be bigger.

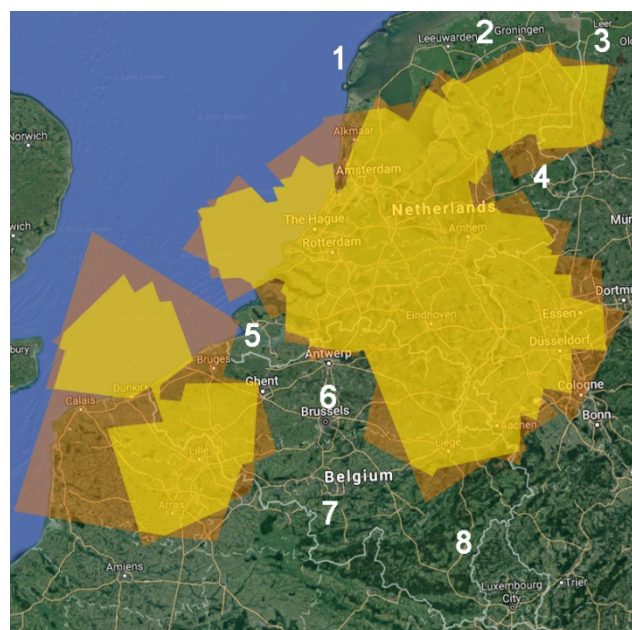


Figure 4 – The surface covered by the cameras at 90 km elevation (orange), yellow parts are covered by at least two or more cameras from different stations. Status as in August 2016. The numbers indicate new capture regions for future expansions of the network.

4 The global CAMS status

Meanwhile the grand totals for the CAMS networks worldwide are available for 2015:

- CAMS California end of 2015: 291110 orbits
- CAMS Benelux end of 2015: 35291 orbits
- CAMS New Zealand end of 2015: 9701 orbits
- CAMS Florida USA end of 2015: 3502 orbits
- CAMS Mid Atlantic end of 2015: 1581 orbits

End of 2015 the CAMS database contained 340000 meteor orbits. *Figure 5* illustrates the performance of CAMS in past years. In 2016 new CAMS networks are being set up like CAMS@United Arab Emirates and CAMS@Arizona.

onwards over 100000 orbits are expected to be added to the CAMS database. This should not only allow to increase the resolution in orbit associations over a long term, but this will also improve the chances to detect short lived periodic activity of minor showers that escaped detection so far.

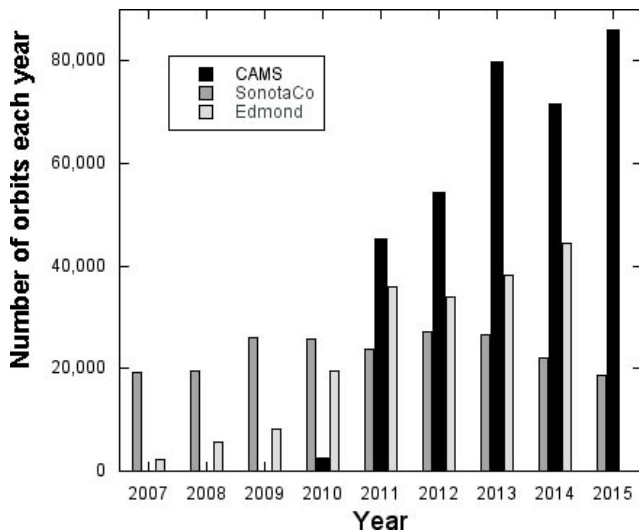


Figure 5 – the annual yield in orbits of CAMS compared to the largest two independent video camera networks.

Acknowledgment

CAMS@Benelux is a video camera network and its success depends completely on the teamwork of many volunteers involved. For CAMS@Benelux until August 2016 the volunteers were:

Cees Bassa (Dwingeloo, operating CAMS 346), *Hans Betlem* (Leiden, operating CAMS 371, 372 and 373), *Felix Bettonvil* (Utrecht, operating CAMS 376 and 377), *Jean-Marie Biets* (Wilderden, operating CAMS 381 and 382), *BISA – Hervé Lamy & Stijn Calders* (Dourbes, operating CAMS 394 and 395, Uccle, operating CAMS 393), *Martin Breukers* (Hengelo, assistant coordinator and operating CAMS 320, 321, 322, 323, 324, 325, 326 and 327), *Franky Dubois* (Langemark, operating CAMS 386), *Luc Gobin* (Mechelen, operating CAMS 390 and 391), *Robert Haas* (Alphen aan de Rijn, operating CAMS 360, 361, 362, 363, 364 and 365), *Klaas Jobse* (Oostkapelle, operating CAMS 331, 332, 337, 338 and 339), *Carl Johannink* (Gronau, coordinator and operating CAMS 311, 312, 313, 314, 315 and 316), *Paul Lindsay* (Lieshout, operating CAMS 356 and 357), *Koen Miskotte* (Ermelo, operating CAMS 351 and 352), *Piet Neels* (Ooltgenplaat, operating CAMS 341, 342, 343 and 344), *Jos Nijland* (Bennebroek, operating CAMS 358 and 359), *Tim Polfliet* (Gent, operating CAMS 396), *Steve Rau* (Zillebeke, operating CAMS 385 and 387), *Paul Roggemans* (Mechelen, operating CAMS 383, 384, 388 and 389) and *Erwin Van Ballegoij* (Heesch, operating CAMS 347 and 348).

Peter Jenniskens coordinates the global CAMS project and *Pete Gural* is the man behind the CAMS software and technology.

Fireball events

Compiled by Paul Roggemans

paul.roggemans@gmail.com

An overview is presented of exceptional fireball events which got covered in Meteor News during the period August – September 2016.

1 Stunning fireball on August 30

Jose Maria Madiedo reports a bolide observed over the South of Spain on 30 Aug. 2016, at 01:57 UT (03:57 local time). The meteoroid impacted the atmosphere at about 130.000 km/h and produced a fireball that began at a height of 97 km over the Mediterranean Sea. The event ended at an altitude of about 37 km over Andalusia (Spain). More see: <https://youtu.be/GTmKAumU-nU>

2 Fireball at 2016-09-03, 20h56m UTC over South Eastern France

François Colas reported a nice fireball appeared over the south eastern parts of France, from Besançon up to Nice. The event was captured by 11 cameras of the FRIPON network and several witnesses reported the event via the Fireball form: http://fireballs.imo.net/imo_view/event/2016/3249.

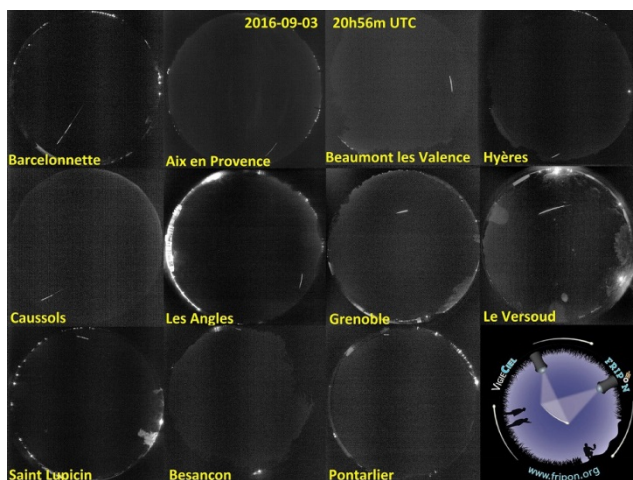


Figure 1 – Selection of the FRIPON stations where this fireball was captured.

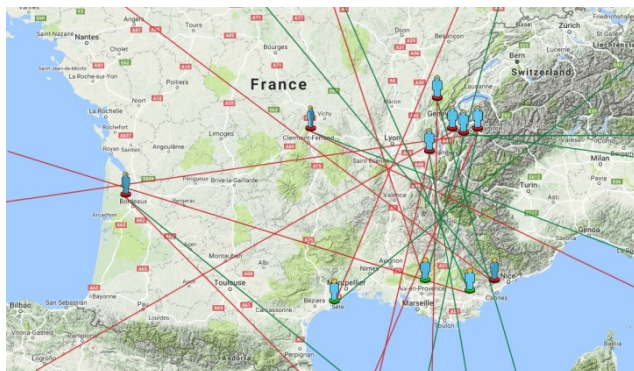


Figure 2 – The observed directions of the fireball by witnesses who reported through the fireball form.

3 Beautiful fireball over Granada on 9 Sept. 2016 (at 1:27 UT)

Jose Maria Madiedo reported a Fireball observed on 9 Sept. 2016 at 1:27 UT over the Mediterranean Sea. The event began at 88 km over the Mediterranean and ended at 35 km over Granada (Spain). More see: <https://youtu.be/6lzcRSEaUdU>

4 Cometary fireball on 27 Sept. 2016 (at 3:11 UT)

Jose Maria Madiedo reported a fireball over the Mediterranean Sea on 27 Sep. 2016 at 3:11 UT (5:11 local time). The event was produced by a meteoroid from Comet P/2005 T4 (SWAN) that impacted the atmosphere at about 250000 km/h. It started at a height of 130 km over the sea level and ended at an altitude of 84 km. It was recorded by several meteor-observing stations operating in the framework of the SMART Project in Spain.

The bolide belongs to the September omicron-Orionids meteor shower. See: <https://youtu.be/TcKQIBsaE9M>

5 Bright Taurid fireball on Sept. 27 (at 20:47 UT)

Jose Maria Madiedo reported a mag. -10 fireball recorded over Spain by the cameras operating in the framework of the SMART Project on Sept. 27, at 20:47 UT (22:47 local time). The meteoroid hit the atmosphere at 30.6 km/s and the luminous phase began at a height of 111 km. The terminal point was located at an altitude of 75 km. The calculated orbital elements show that the bolide belongs to the Northern Taurids meteor shower. The following YouTube video shows the footage obtained from two meteor-observing stations, and also the atmospheric path of the meteor: <https://youtu.be/tNBUnkUOHg>

Long and fast trail meteor

Carlos Saraiva

A long and fast trail meteor with a magnitude estimated of -2, has been captured on 22th September by four PMN (Portuguese Meteor Network) systems, NASO1, TEMPLAR1, TEMPLAR4 and RO2.

1 Introduction

A long and fast trail meteor with a magnitude estimated of -2, has been captured on 22th September in the early morning by four PMN (Portuguese Meteor Network) systems, NASO1, TEMPLAR1, TEMPLAR4 and RO2.

2 The trajectory

Rui Gonçalves calculated its trajectory, velocity and mass. It was detected from 115.3 Km to 93.5 Km with an initial velocity of 62.2 Km/s. Rui Gonçalves also estimated its mass as being less than 1 gram.

Here are some impressions of this peculiar meteor:

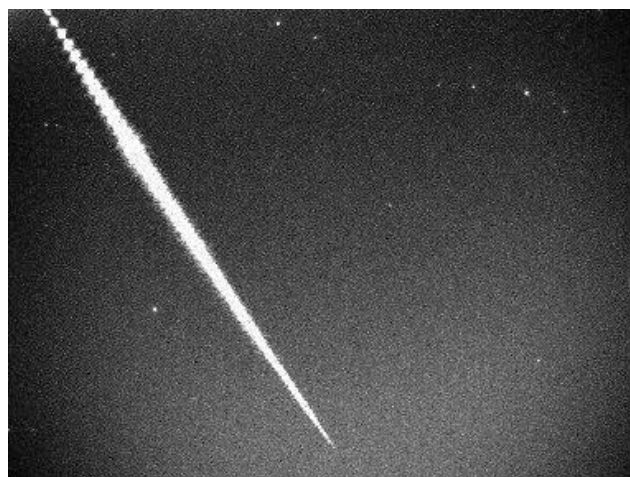


Figure 3 – RO2 summed image.

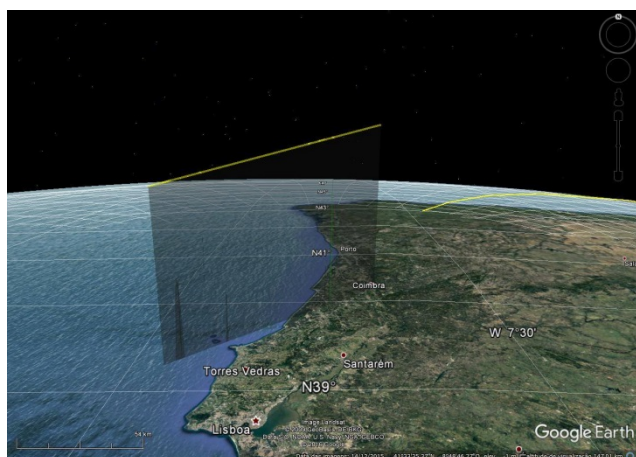


Figure 1 – Fireball atmospheric trajectory over Portugal.

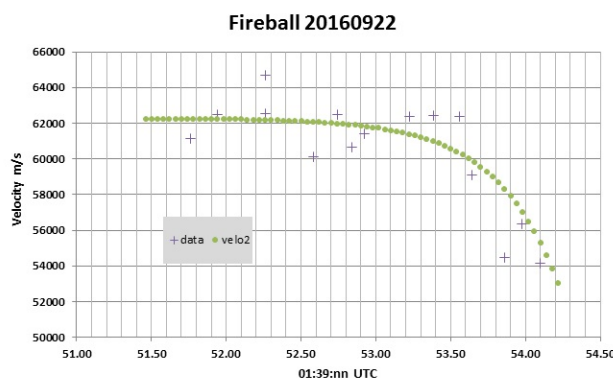


Figure 4 – Velocity data fit.



Figure 2 – NASO1 summed image.

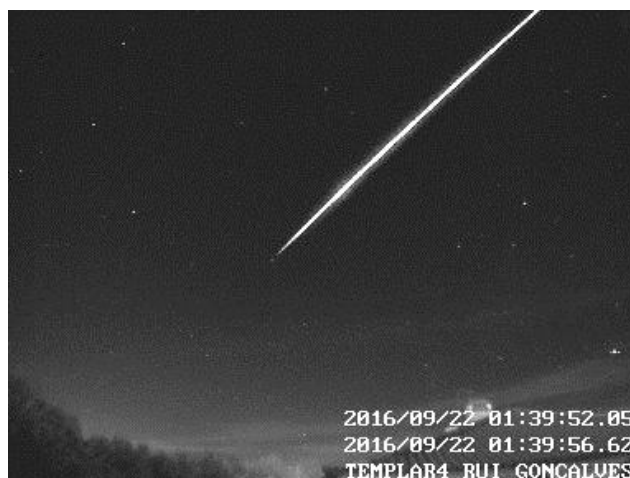


Figure 5 – TEMPLAR4 summed image.

Another long but slow trail meteor over Portugal

Carlos Saraiva

A long and slow trail meteor with an absolute magnitude estimated of -2, captured on 29th September early morning by four PMN (Portuguese Meteor Network) systems; TEMPLAR1 and TEMPLAR2, RO2 and RO3.

1 Introduction

A long and slow trail meteor with an absolute magnitude estimated of -2, captured on 29th September early morning by four PMN (Portuguese Meteor Network) systems; TEMPLAR1 and TEMPLAR2, RO2 and RO3.

2 The trajectory

Rui Gonçalves calculated its trajectory, velocity and initial mass. It was detected from 94.7 km to 72.1 km with an initial velocity of 19.5 km/s. The estimated photometric mass is around 5 g.



Figure 3 – RO2 summed image (near Lisboa).



Figure 1 – TEMPLAR1 summed image (near Tomar).



Figure 4 – RO3 summed image (near Lisboa).

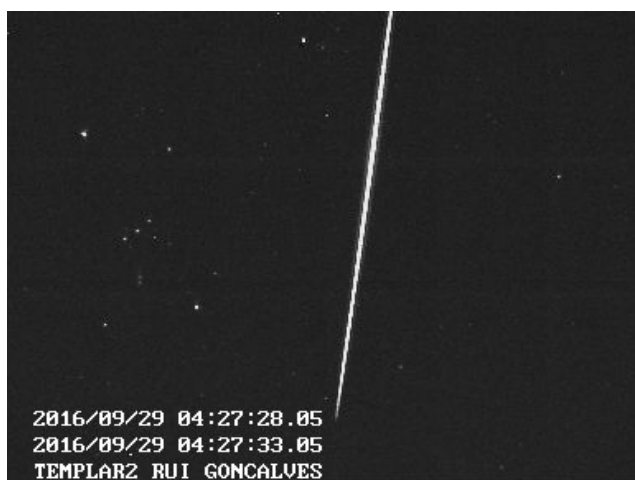


Figure 2 – TEMPLAR2 summed image (near Tomar).

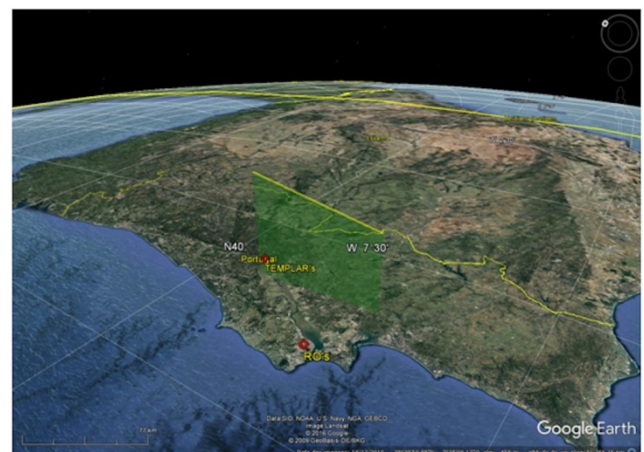


Figure 5 – Fireball atmospheric trajectory over Portugal.

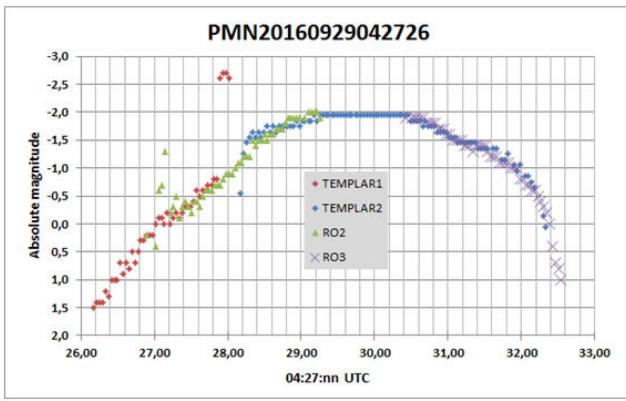


Figure 6 – Corrected absolute magnitude versus time.

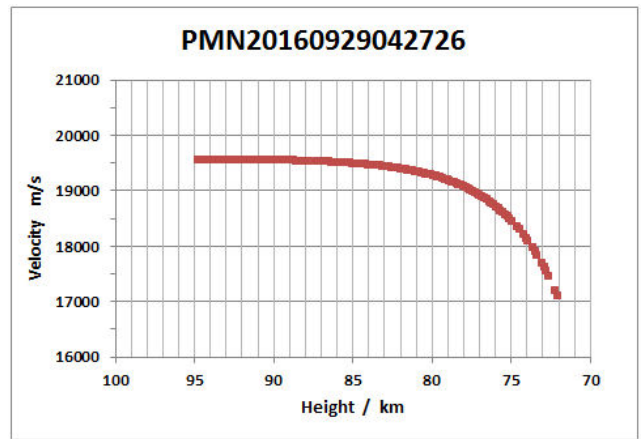


Figure 7 – Velocity fit versus height.

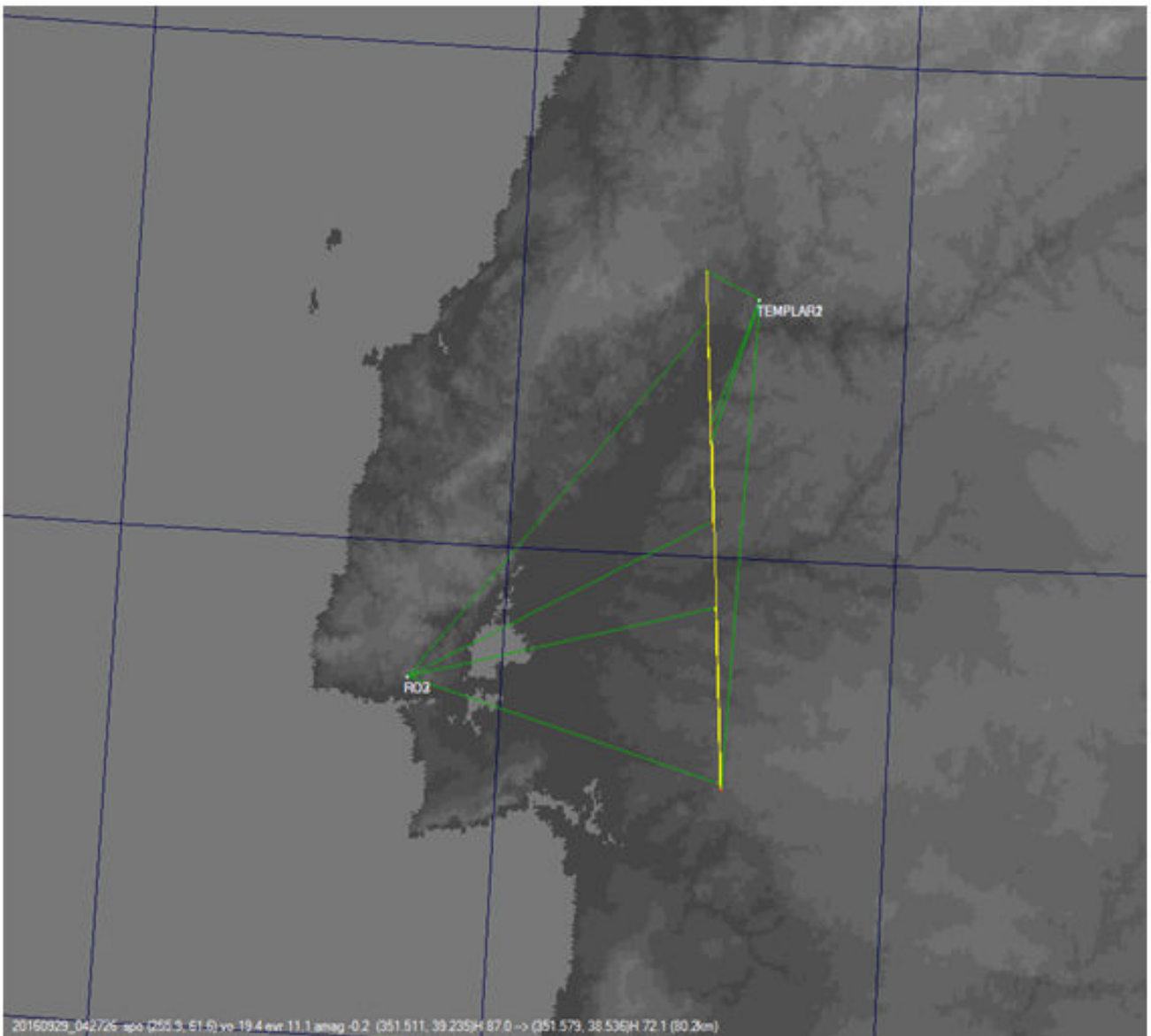


Figure 8 – Ground projection from UFO software.

Fireball over United Kingdom on 23 September 2016

Richard Kacerek

19 Comet Close, Ash Vale, Surrey, GU125SG, United Kingdom
rickzkm@gmail.com

On 23 September 2016 at 22:34:15 UT United Kingdom saw another fireball. Long overdue for one, in 2016 UKMON network captured only 4 fireballs. Much lower counts than other years.

This fireball was first spotted by public using IMO Fireball Report Form and quickly reported by UKMON's first station in Ash Vale via Twitter and YouTube: <https://youtu.be/RZvvmBTq7gE>.

Preliminary calculations (without deceleration) show that meteor was a Sporadic one with -6.2 magnitude brightness. Initial velocity was 31.9 km/s at 107km.

Terminal altitude is estimated at around 50km. The final explosion was probably around -10 mag.



Figure 3 – Hampshire Astronomy Group SE (Clanfield).



Figure 1 – Ash Vale.



Figure 4 – Klaas Jobse also confirmed this fireball from All Sky Camera in Holland.



Figure 2 – Wilcot station SE.

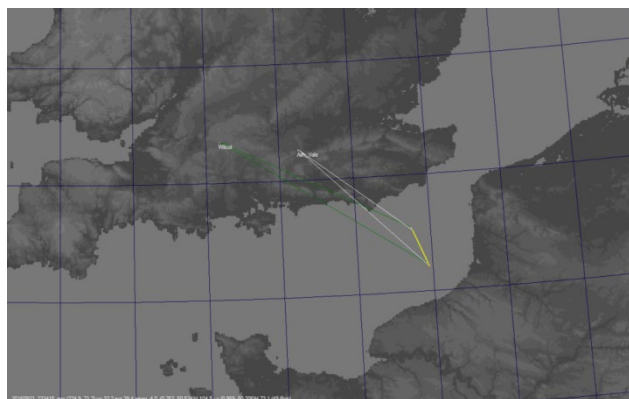


Figure 5 – The trajectory above the Channel..

Observations by RAMBo

Lorenzo Barbieri, Gaetano Brando and Giuseppe Allocca

RAMBo meteor group, AAB, Associazione Astrofili Bolognesi, Bologna, Italy
barbieriofiuco@gmail.com

RAMBo (Radar Astrofilo Meteorico Bolognese) has noticed an increased activity at the time of the Gamma Draconids outburst. The Perseid activity has been monitored by RAMBo too.

1 Gamma Draconids

On August 2 – CBAT telegram No. 4292 reported the analysis of the video data made by Peter Jenniskens of the SETI Institute for the night of 28–29 July. In this analysis he described a strong shower activity related to the Gamma Draconids (IAU 184 GDR) observed by cameras in the Netherlands and Belgium without reporting, however, the hourly rate.

In the same telegram, Peter Brown of the Canadian Meteor Orbit Radar noted this intense activity lasting about two

hours centered on midnight on 28 July and with a visual ZHR of about 50 meteors per hour.

Actually RAMBo (Radar Astrofilo Meteorico Bolognese) <http://www.ramboms.com/> had noticed an increased activity at that time.

The hourly chart shows a peak of increased activity on 28 July at midnight, about four hours before the predicted peak time.

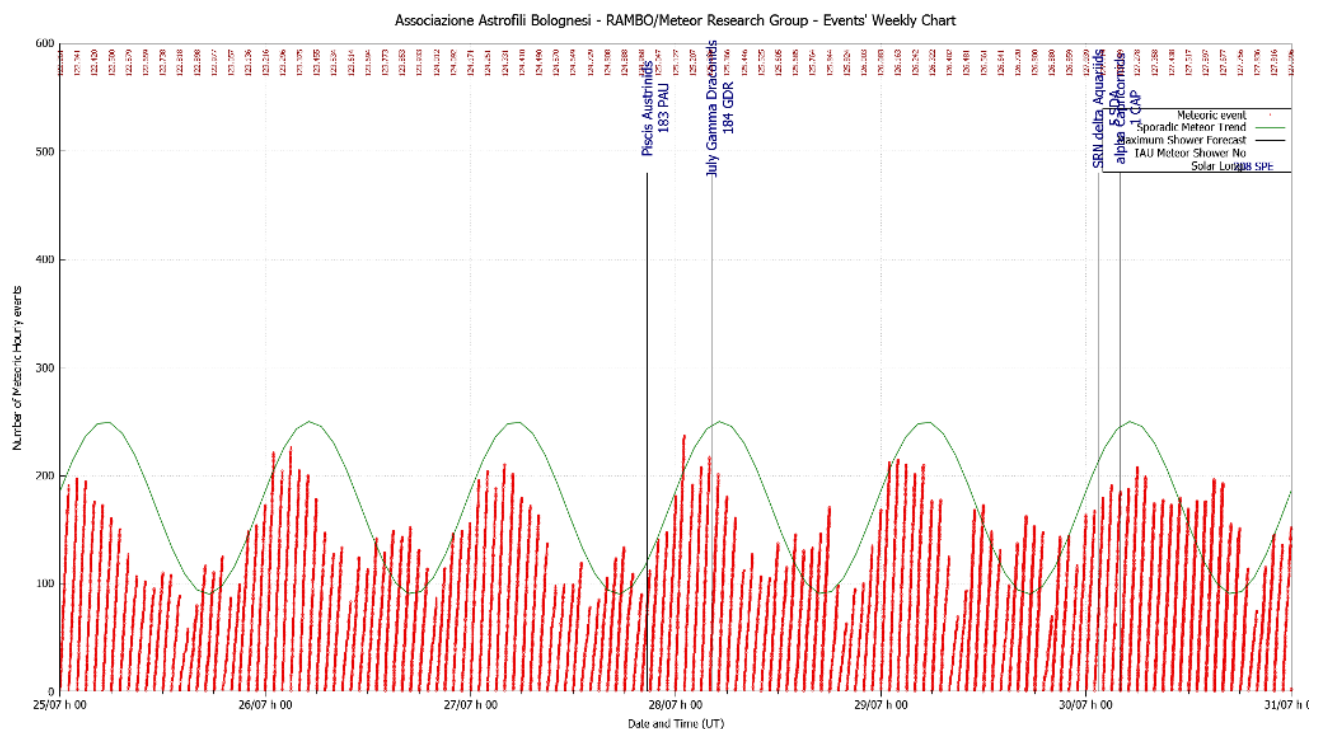


Figure 1 – Gamma Draconids observed by RAMBo.

2 Perseids 2016

In these graphics the Perseids activity seen by RAMBo. Also the narrow peak centered on Aug. 11 at 23^h20^m UTC is well seen (Figure 2).

3 Kappa Leonids on Friday 23/9

On Friday, September 23 at 13 UT the RAMBO system has revealed a weak evidence of the Kappa Leonids

shower, who reached a double hourly rate in comparison to sporadic.

The maximum occurred fifteen minutes after the forecast (at solar longitude 180.7).

The amplitude and analysis of the echoes durations suggests meteoroids of low masses.

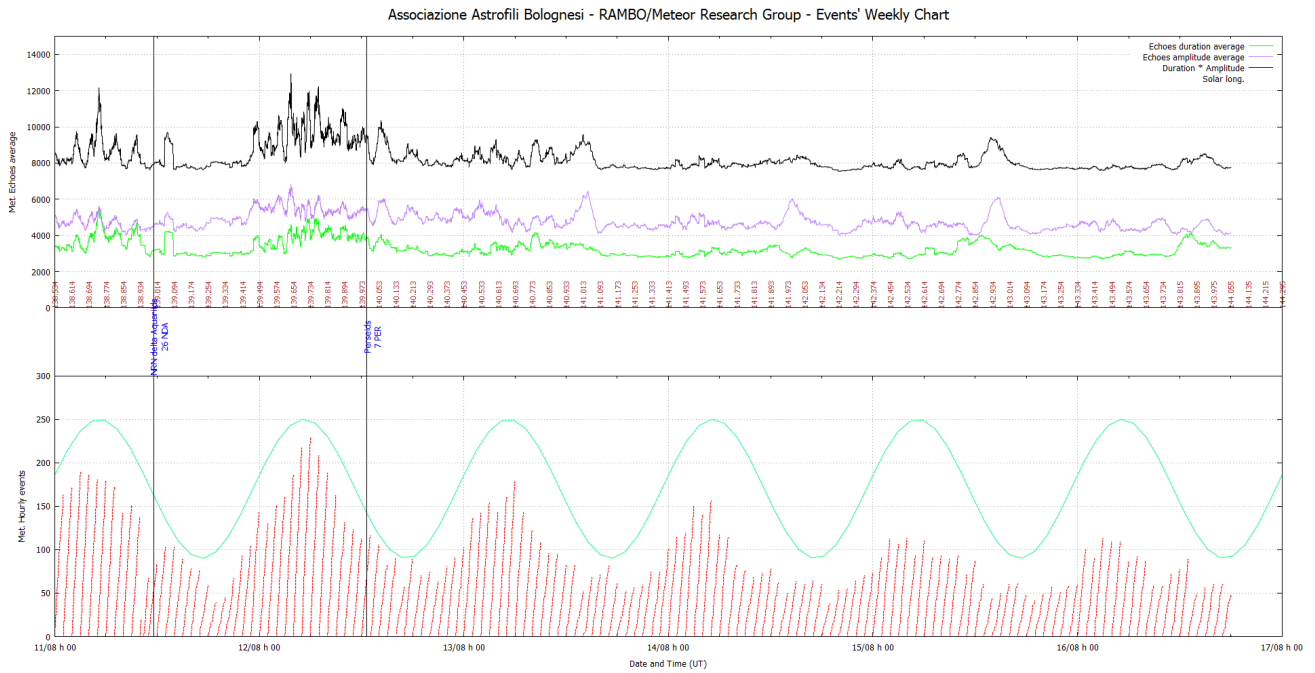


Figure 2 – 2016 Perseids observed by RAMBo.

Associatione Astrofili Bolognesi - RAMBO/Meteor Research Group - Events' Weekly Chart

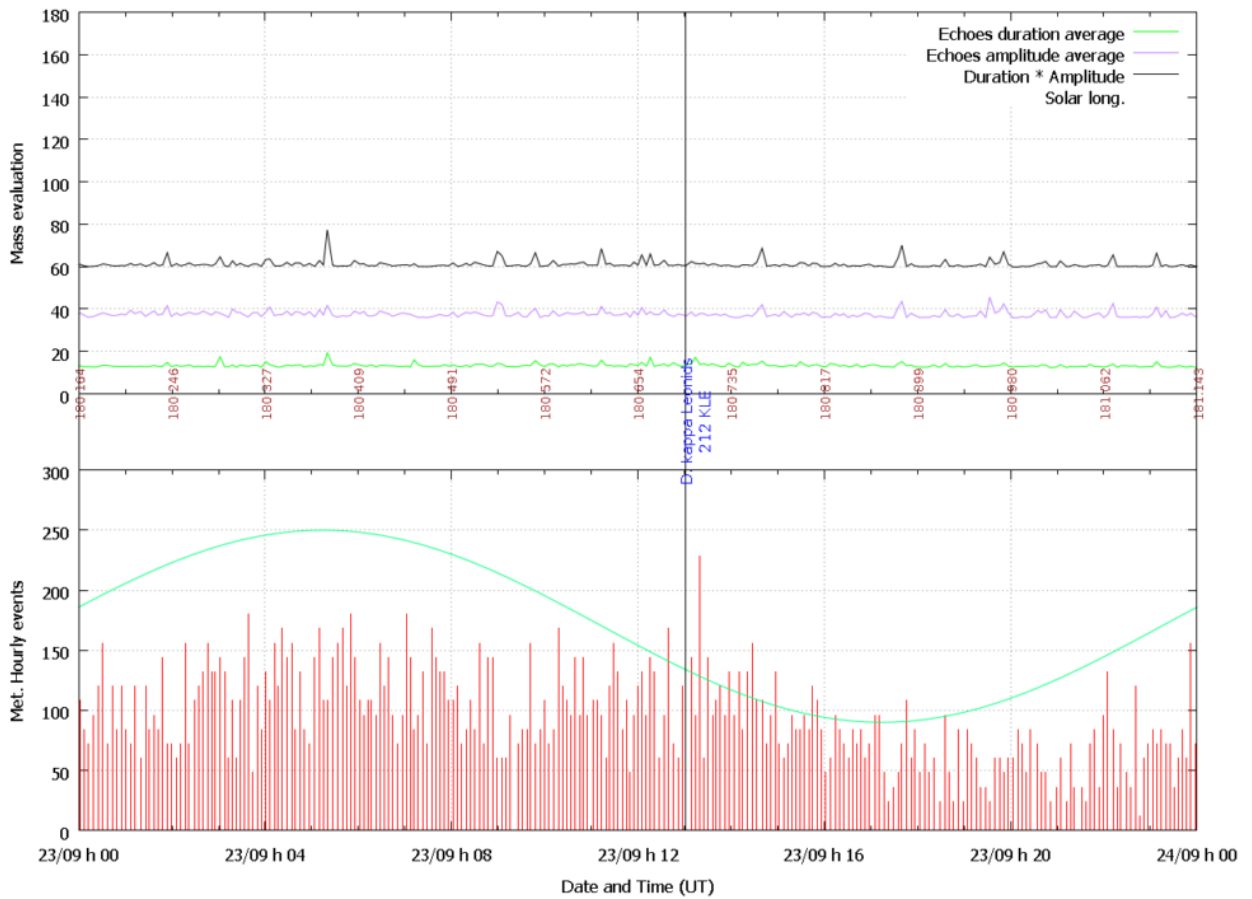


Figure 3 – 2016 Kappa Leonids observed by RAMBo.

Contacts

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Webmaster & account administrator:

- Roman Piffel (Slovak Republic): roman.piffel at gmail.com

Editors:

- Salvador Aguirre (Mexico): drsaguirre at yahoo.com
- Karl Antier (France): karl.antier at laposte.net
- Lorenzo Barbieri (Italy): barbieriofiuco at gmail.com
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- Antal Igaz (Hungary): antaligaz at yahoo.com
- Paul Jones (USA): jonesp0854 at gmail.com
- Richard Kacerek (United Kingdom): rickzkm at gmail.com
- Jakub Koukal (Czech Republic): j.koukal at post.cz
- Marco Langbroek (the Netherlands): asteroids at langbroek.org
- Robert Lunsford (USA): lunro.imo.usa at cox.net
- Esko Lyytinen (Finland): esko.lyytinen at jippii.fi
- Jose Maria Madiedo (Spain): jmmadiedo at gmail.com
- Koen Miskotte (the Netherlands): K.miskotte at upcmail.nl
- Hiroshi Ogawa (Japan): h-ogawa at amro-net.jp
- Paul Roggemans (Belgium): paul.roggemans at gmail.com
- Carlos Saraiva (Portugal): Carlos.saraiva at netcabo.pt
- Hirofumi Sugimoto (Japan): hiro-sugimoto at kbf.biglobe.ne.jp
- Your name here? You are very welcome! Contact roman.piffel at gmail.com!